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Observations on the Protoxide of Mercury and the Atomic Weight of that Metal. By Samuel Allinson, Jun.—Read October 28, 1828.

Perhaps no chemical fact has been considered as better established than the existence of two distinct oxides of mercury, the black and the red; but from some recent investigations it seems most probable that the former is but a mixture of the latter with metallic mercury.

During the last winter having occasion to prepare the powder supposed to be a protoxide of mercury, I did it by decomposing the protochloride with a solution of potassa. In drying it was exposed to a gentle heat, certainly not 212° Fahrenheit, and I was astonished upon finding in it globules of mercury. Being accustomed to consider it a perfect oxide I was unable to account for the phenomenon, nor could I obtain from any with whom I conversed upon the subject a satisfactory explanation. Several portions which

I afterwards prepared also contained them; nor did I find any difference with regard to this fact whether it was prepared from the protochloride, protacetate or protonitrate of mercury, with lime-water, potassa or ammonia. The globules though often visible are not always so to the naked eye, but I have never failed to render them evident by a slight degree of friction with my finger. Percussion and elevation of temperature also produce the same effect. I am indebted to Thomas Evans for an observation which I have since repeatedly verified, that when an alkaline solution is poured on calomel, however often the latter may have been edulcorated to remove corrosive sublimate, a reddish powder is at first apparent*. This fact and the subsequent evidence of the existence of metallic mercury in the preparation may serve to explain each other and lead us to the conclusion (which since the commencement of my experiments I have learned is the opinion of Guibourt and Orfila, though it has certainly not been generally adopted either in this country or in England) that the protoxide of mercury is only capable of existing in combination with acids. According to this view, when a protosalt of mercury is decomposed by an alkali, the whole of the oxygen previously combined with the mercury in the form of protoxide, combines with one half of it; thus forming the peroxide, through which the remaining proportional of metal in a state of extreme comminution is mixed.

The black oxide has been considered as composed of one atom of oxygen and one of mercury, and the red oxide as containing an additional atom of oxygen: but if the experiments which I have performed with much care are correct,

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* A careful repetition of this experiment has placed its accuracy beyond a doubt. On calomel prepared by precipitation from a solution of crystallized protonitrate of mercury with muriate of soda, and which was repeatedly washed with warm distilled water, with solution of muriate of ammonia and with warm alcohol, I poured a small quantity of potass water. A reddish powder was very distinctly observable. When sufficient alkali was added to decompose the calomel, the powder was a brownish black and contained visible globules of metal. This shows the fallacy of one of the reputed tests for the purity of calomel.

either the red oxide is a combination atom to atom, or the generally received theory in which binary compounds are considered as always more difficult of decomposition than ternary is in the present instance infringed. It is possible that the latter may be the case; though, from the general perhaps universal correctness of the theory, it appears to me most probable that the atomic weight of mercury has been mistaken, and that it is 100 instead of 200 as stated by Davy and others.

It has been objected to the opinion that the protoxide of mercury does not exist in an insulated state, that the colour of the powder is not such as would result from a mixture of that of the peroxide with the silver colour of mercury. This difficulty may be removed by stating that other metals by a fine division of their particles lose their peculiar colour and metallic lustre (powdered gold, silver and tin for instance); and that mercury when condensed from the aerial state, before its particles have united together, is of a black colour. (See Paris's Medical Jurisprudence, Vol. II. art. Aerial Poisons.) Another more plausible objection which may be advanced, and one which for some time had considerable weight with myself, is, that the friction, percussion, elevation of temperature, &c. may each be capable of effecting the reduction of a part of the oxide. But in several instances, before resorting to either of these means, the globules have been visible to the naked eye, and in others they have been rendered visible by simply drawing my finger once over the powder, the slight pressure attending which could only have brought already existing uncombined particles within the sphere of each other's attraction. The metal may also be made apparent by pouring on the powder a minimum quantity of diluted acetic acid: the supernatant liquor will be found to contain peracetate. Protacetate is also formed; but this is owing to the presence of the metallic mercury: solutions of persalts being partially converted into protosalts by agitation with the metal. When the precipitate formed by adding potassa to the protonitrate of mercury is placed on a piece of pol-

ished gold, in a short time the surface is found to be amalgamated; an additional evidence of the existence of metallic mercury in the article in question.

In the tenth London edition of Henry's Chemistry there is reference to a paper by Brande in the Quarterly Journal of Science, Vol. XVIII. page 291, for a satisfactory refutation of the opinion of Guibourt respecting the protoxide and protosulphuret of mercury.

I have not examined the protosulphuret nor read the arguments advanced by Guibourt; but those of Brande have not effected a change in my sentiments with regard to the protoxide. He seems to consider that because the black powder obtained by decomposing protosalts of mercury with alkalies is uniform in the quantity of oxygen it contains, which is exactly half the proportion found in the red oxide, that it must be a perfect oxide. I imagine that neither Guibourt nor any one else would dispute the existence of an extensive list of protosalts of mercury, nor that the proportion of oxygen combined with the metal in these is exactly half of that in the persalts; but it is contended that the protoxide cannot be obtained in an insulated state. He also observes that "the iodide of nitrogen and fulminating silver and mercury, unquestionably chemical compounds, are decomposed by slight mechanical means." But, as has been stated, the globules are frequently visible without resorting to mechanical means or exposure to light or heat, and the reddish powder observed by T. Evans when calomel is decomposed is an incontestable evidence that the change to peroxide and uncombined metal is effected at the instant the salt is decomposed.

It may be proper here to observe that a very great difference of colour, and most probably of chemical composition, exists in the article kept by different apothecaries under the title of black or protoxide of mercury. I have found it varying from a brownish red to a light lead colour. This is doubtless owing to a difference in the mode of preparation. The "hydrargyri oxydum cinereum" of the London, Edinburgh

and American Pharmacopœias cannot but be considered as a very unscientific preparation, unless it is designed to contain a variable quantity of carbonate of lime. The operation must be performed with free access to the open air, as constant stirring is directed; and the light colour of the resulting powder proves that it contains either carbonate of lime or undecomposed calomel (very probably both); for the powder obtained by simple agitation of calomel with lime water, is of a brownish black colour. The boiling directed is wholly unnecessary, as lime water at the usual temperature will completely decompose calomel; and as it introduces uncertainty, it should be dispensed with. If the medical efficacy of the *black powder of mercury* renders it a desirable article in the list of the Materia Medica, it is absolutely requisite that more care should be bestowed in its preparation. I am induced to prefer precipitating it by means of pure caustic potash or lime water, from the protonitrate. If, however, instead of this, calomel be used, *ammonia* should not be employed to decompose it, as it appears to be capable of forming a triple salt. The precipitate (after washing) should be dried between the folds of bibulous paper, and carefully preserved from light, as this decomposes the per-oxide.

Whether the opinion respecting the protoxide, which I have supported, is correct or incorrect, I believe I am warranted in repeating my suggestion, that the atomic weight of mercury has been mis-stated. Henry remarks that it is "a fundamental proposition of Mr Dalton, the consistency of which with mechanical principles he has fully shown, that *that* compound of any two elements which is with most difficulty decomposed, must be presumed, unless the contrary can be proved, to be a binary one."

In another place he says, "the most simple compounds are universally the most difficult to be decomposed." This being the case with the peroxide, perchloride and persulphuret of mercury, we must suppose them to be binary compounds; and as the atomic weights of oxygen, chlorine,

and sulphur, are among the most certainly correct, the conclusion is irresistible that that of mercury is 100. An additional evidence is the fact that the only compound of mercury and cyanogen is now considered as containing two atoms of the latter to one of the former. If the weight of the metal be 100, the compound is binary.

In accordance with this view, I have prepared the annexed table of the chemical composition and corrected atomic weights of a number of mercurial salts. The analysis of some of them requires repetition before they can be regarded as completely fixed. I have been guided principally by Brande in this department.

Table of atomic weights, &c.

		Corrected comp. & weight.		*Old theory of comp. & weight.*		
Oxides	100 m. + 4 ox.	2.1	208	1.1	208	Protoxide
	100 m. + 8 ox.	1.1	108	1.2	216	Peroxide
Chlorides	100 m. + 18 ch.	2.1	236	1.1	236	Protochloride
	100 m. + 36 ch.	1.1	136	1.2	272	Perchloride
Iodides	100 m. + 62 i.	2.1	325	1.1	325	Protiodide
	100 m. + 124 i.	1.1	225	1.2	450	Periodide
Sulphurets	100 m. + 8 s.	2.1	216	1.1	216	Protosulphuret
	100 m. + 16 s.	1.1	116	1.2	232	Persulphuret
Cyanide	100 m. + 26 c.	1.1	126	1.2	252	Cyanide
Hydriodate	208 ox. + 125 a.	1.1	334	1.1	334	Hydriodate
Nitrates	208 ox. + 54 a.	1.1	262	1.1	262	Protonitrate
	108 ox. + 54 a.	1.1	162	1.2	324	Pernitrate
	432 ox. + 54 a.	4.1	486	2.1	486	Subpernitrate
	108 ox. + 216 a.	1.4	324	1.2	648	Bipernitrate
	208 ox. + 108 a.	1.2	316	1.2	316	Bipronitrate
Sulphite	208 ox. + 32 a.	1.1	240	1.1	240	Sulphite
Sulphates*	208 ox. + 40 a.	1.1	248	1.1	248	Protosulphate
	108 ox. + 40 a.	1.1	148	1.2	296	Persulphate
	216 ox. + 40 a.	2.1	256	1.1	256	Subsulphate
	108 ox. + 80 a.	1.2	188	1.4	376	Bisulphate
Phosphates	208 ox. + 28 a.	1.1	236	1.1	236	Prophosphate
	108 ox. + 28 a.	1.1	136	1.2	272	Perphosphate
Carbonates	208 ox. + 22 a.	1.1	230	1.1	230	Protocarbonate
	108 ox. + 22 a.	1.1	130	1.2	260	Percarbonate
Borates	208 ox. + 22 a.	1.1	230	1.1	230	Protoborate
	108 ox. + 22 a.	1.1	130	1.2	260	Perborate
Arseniates	208 ox. + 71 a.	1.1	279	1.1	279	Protoarseniate
	108 ox. + 71 a.	1.1	179	1.2	358	Perarseniate.

* The crystallized protosulphate contains two atoms of water. Its atomic weight, therefore, is 248 + 18 = 266.

Remarks on the Preparations of Iodine and their Compounds; extracted from an Inaugural Thesis by W. R. Fisher.

The progressive increase of the demand for the preparations of iodine which has attended it since its first introduction into the Materia Medica by Dr Coindet of Geneva, as well as the unsettled state in which the formulæ for the constitution of most of its pharmaceutic compounds exist, we trust will be deemed sufficient cause for the following remarks at this time.

Should they even serve no better purpose than to call the attention of the two professions of medicine and pharmacy to the necessity of adopting some certain formulæ which should increase the facility of prescription and insure to the patient the exact dose intended by his physician, the labour spent in their compilation will be fully requited.

The original prescriber, Dr Coindet, recommended the ioduretted hydriodate of potash; and the great diversity of opinion on the most proper mode of exhibition has led to as great a diversity of formulæ, viz. the tincture of iodine, solution of iodine, liquor of iodine, solution of the ioduretted hydriodate of potash, the iodides of sulphur, the iodides of mercury, ointment of iodine, liniment of iodine, ointment of iodine and calomel, ioduretted sulphuric ether, and ointment of iodide of zinc.

Tincture of Iodine—

℞.—Iodine, gr. 48,
Alcohol, ʒj. m. ft. tinct.

This is the recipe of Dr Coindet. Magendie's recipe is similar, with the exception of directing the density of the alcohol employed to be 35 degrees Beaumé's areometer. In a recipe procured from a gentleman of this city, who we believe extracted it from a French treatise on the subject,

the iodine is directed in the proportion of twenty-four grains to an ounce of alcohol.

In a communication by Dr Fahnestock on this subject*, it is recommended, that the tincture should be made of half a drachm of iodine, to the same quantity of spirit as directed by the others; and the author complains of the tincture of Magendie, as being too strong. This may be accounted for by the difference in the weights employed in English and French pharmacy. On this subject the Journal de Pharmacie contains the following remarks: "at Geneva and in France where the preparations of iodine were first employed, it was directed to use for the tincture, forty-eight grains to an ounce of alcohol; but the grain intended was the "*poids de marc.*" While in other parts of Switzerland and Germany, the *medicinal weight of Nuremburg* was employed; and in England the *troy weight.* The division by these of the scruple is into twenty grains, while by the "poids de marc" it is into twenty-four grains.

Hence, in the largest part of Switzerland and Germany, and in England, a tincture was prepared stronger by one-fifth than that which was intended. Attention to this difference of weights, should always be observed in the translation of the recipes from the French.

From our own observation in the preparation of this tincture, we feel induced to concur with Dr Fahnestock, in recommending the employment of half a drachm to the ounce, which forms nearly a saturated tincture with the alcohol of the shops, varying from 33 to 35 degrees Beaumé. At all events a specific standard should be adopted; and the preparation of so important and powerful a medicine be no longer left to arbitrary opinion. In the recipes above quoted, the strength varies 100 per cent. from the weakest up to the strongest directed. An author already referred to gives the following caution respecting the tincture. "It has been ascertained, that when suffered to stand any time it deposits crystals; and may form the ioduretted hydrio-

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* American Journal of the Medical Sciences, February 1829.

dic acid: it should therefore be prepared for immediate use, and in small quantities." This deposit of crystals has never come under our notice, although we have frequently seen the tincture upwards of three or four months old.

May not the deposit of crystals be owing to supersaturation, or a partial evaporation of the alcohol?

Liquor of Iodine—

℞.—Potass. hydriodat. gr. 36 = 30 *troy.*
Iodine, gr. 10 = 8 *troy.*
Aq. distillat. ℥x. m. ft. solut.

This recipe is only a weaker solution of the iodurettted hydriodate of potash than the following directed by Dr Coindet:

℞.—Potass. hydriodat. gr. 36 = 30 *troy.*
Iodine, gr. 10 = 8 *troy.*
Aq. distillat. ℥j. m. ft. solut.

By this formula the strength is ten times greater than by the preceding, which should be called by a name more expressive of its constitution. It may otherwise be mistaken from its similarity of title for the solution of iodine, which differs from it essentially in composition.

Solution of Iodine—

℞.—Potass. hydriodat. gr. 24 = 20 *troy.*
Aq. distillat. ℥j. m. ft. solut.

Under the name of solution of hydriodate of potash, Magendie gives the following formula, slightly differing from the preceding:

℞.—Potass. hydriodat. gr. 36 = 30 *troy.*
Aq. distillat. ℥j. m. ft. solut.

This may be converted into the solution of the iodurettted hydriodate of potash, by simply adding ten grains of pure iodine to it.

Iodides of Sulphur—

The iodides of sulphur may be made by applying a moderate heat to a direct combination of the two substances. The American Journal of Medical Sciences, for May 1828, contains an extract from the "Journal des Progres," &c. Vol. VI. from which the following information is collected rela-

tive to these iodides employed as medicinal agents. From Dr Biett's experiments with the iodides of sulphur, he is induced to conclude that they are among the most active agents for the cure of cutaneous diseases; but that they must be used with caution. They are to be mixed with some fatty matter, in the proportion of a twenty-fifth, a twentieth, or a sixteenth. With this knowledge of the strength of the remedy, it may, perhaps, be as well left to extemporaneous prescription, especially as all the compounds of iodine are so readily affected by light, and so easily decomposed.

Iodides of Mercury—

These compounds have recently attracted a degree of attention from their application to the treatment of syphilis. Of the two iodides there are several formulæ for pills, ointment, solutions, &c. but for reasons already given of the facility with which preparations decompose, we have thought it as well to omit noticing them here; believing that every practitioner would become fully acquainted with their doses and powers, and that none of them may be properly considered officinal. For the method of preparing them the following directions are subjoined:

Protiodide of Mercury—

Take of crystallized pronitrate of mercury, 100 parts,
distilled water, 400 parts.

Dissolve the salt in the water, and add a solution of hydriodate of potash until a precipitate is no longer formed. A yellowish green precipitate is procured, which must be separated by a filter. This must be washed with distilled water, until the water which passes over no longer affords a precipitate with potash. The powder must then be dried, and preserved in bottles secured from the light. According to Mr Thomson, the constitution of the protiodide is,

1 atom iodine, 124,
1 atom mercury, 200,

324, the atomic weight of this iodide of mercury.

Deutiodide of Mercury—

Deutochloride of mercury, 70 parts,
Hydriodate of potash, 100 parts.

Each salt to be dissolved separately in water. The solutions are then to be mixed, in small quantities. A red powder will be precipitated, which must be caught on a filter and washed with great care, until the water passes over free of taste. The precipitate must then be dried and kept in bottles, secluded from the light. Its composition is,

2 atoms iodine, 248,
1 atom mercury, 200,

448, the atomic weight or combining number.

Both these iodides are insoluble in *water*, but are soluble in a solution of hydriodate of potash.

Ointment of Iodine—

℞.—Hydriodatis potassæ, ʒss. = 24.6090 *troy.*
Axung. ʒj. m. ft. ung.

Ointment of Hydriodate of Potash—

℞.—Hydriod. potassæ, ʒss. 24.6090 *troy.*
Ung. simplicis, ʒiss. m. ft. ung.

These preparations differing in name are very similar in constitution. The former being, as is apparent, rather the stronger. These may readily be converted into ointments of the ioduretted hydriodate, by adding 10 or 15 grains of iodine to the above quantity.

Liniment of Iodine—

℞.—Tinct. iodine, ʒj.
Linim. saponis, ʒj. m. ft. linim.

The strength of this liniment must necessarily vary, so long as the varieties in the strength of the tincture, as we have endeavoured to point out, continue to exist.

Ointment of Iodine and Calomel—

℞.—Iodine, 1 part,
Calomel, 1½ parts,
Axung. 48 parts.

The iodine to be first mixed with the lard, and the calomel added. This recipe is extracted from the N. A. Med. and Sur. Journal for October 1827. It is submitted by Messrs Planche and Souberaine, as calculated to meet indications, where the effects of iodine and calomel are both required, and not in a state of chemical combination. "In other proportions of these ingredients there is a decomposition of the calomel by the iodine: and either *corrosive sublimate* and the *deutiodide of mercury* are produced; or if the iodine be in excess, the surplus remains mixed with the two salts; or finally, if the calomel be in excess, there results a mixture of *undecomposed calomel, corrosive sublimate,* and the *protiodide of mercury,* with a small portion of the *deutiodide.*" Some experiments, which we have instituted to test the accuracy of these assertions, appear to correspond fully in their results.

An indispensable requisite to the complete formation of this ointment, is the solution of the iodine in a few drops of alcohol, previous to adding the lard; otherwise, owing to its unctuosity, it is impossible to pulverize it, and, of course, to distribute it equally throughout the mass.

Iodureted Sulphuric Ether—

℞.—Iodine, gr. 6 = 4.9223 *troy.*

Ether. sulph. ℥j. ft. solut.

"This preparation contains in thirty drops of it one grain of iodine." This, of course, must vary, with the density of the ether, and the size of the vessel from which it is dropped.

Ointment of Iodide of Zinc—

℞.—Iodide of zinc, ℥j.

Ung. simplicis, ℥j. m. ft. ung.

This has been recommended by Dr Ure, to replace the ointment of hydriodate of potash.

Remarks on the Bicarbonate of Soda; extracted from an Inaugural Thesis, by Franklin R. Smith.

Under the title of sodæ carbonas the American and British pharmacopœias direct the preparation of what has generally been considered the bicarbonate of soda.

The American pharmacopœia directs it to be prepared by the decomposition of the sesquicarbonate of ammonia, which at the time of its adoption was the process of the Edinburgh college. The carbonic acid contained in the quantity of sesquicarbonate of ammonia prescribed by the colleges, Mr Philips has shown to be insufficient to saturate the soda. Since that period the Edinburgh college has rejected the process entirely, and adopted one similar to that of the London college.

The two colleges now agree in directing it to be prepared by transmitting carbonic acid gas through carbonate of soda in solution; but differ in the temperature at which the subsequent evaporation should be conducted. The directions of the London college are preferable, inasmuch as by them 120 degrees Fahrenheit are to be employed, which is 60 degrees less than the prescription of the Edinburgh college.

The processes above detailed were supposed to afford the bicarbonate of soda until the researches of Mr Philips showed the resulting salt to be a sesqui instead of a bicarbonate. Since the promulgation of his experiments, the opinion has obtained here that the ordinary bicarbonate of our shops was likewise a sesquisalt. A knowledge of the fact that the process by which it is prepared is different from that of the colleges, and from any mentioned in our chemical authors, induced an examination of the article, the preparation of which is conducted as follows.

Carbonate of soda in its ordinary state is placed in a box contrived for the purpose and surrounded by an atmosphere of carbonic acid gas, under pressure. The salt absorbs the

gas, and as the new compound combines with less water than was contained in the old, a considerable quantity of fluid drains off. When the gas ceases to be absorbed, the salt is removed and dried.

Upon inspection of the apparatus after the cessation of the process, the salt is seen retaining the original form of the pieces submitted to the action of the gas, but its structure from being compact is now loose and porous, its vitreous lustre and fracture are also lost, a new arrangement of its particles having taken place as is evinced by the altered texture of the mass. This presents the appearance of numerous crystalline grains aggregated together, having a beautiful snow-white colour and slightly alkaline taste.

The advantages arising from this method are,

1. The previous solution directed by the colleges is rendered unnecessary.

2. A much larger quantity of solid matter can be operated upon in vessels of equal dimensions.

3. The subsequent evaporation and crystallization directed by the colleges, are in a great measure dispensed with, and the expenditure of time and labour attending the dissipation of so large a quantity of water as is directed, particularly in the London formula, is saved.

These advantages have given this process the preference. Care however is required to continue the production of the gas a sufficient time, because owing either to neglect of this particular or to the temperature employed in drying, the different specimens of the salt do not contain an equal proportion of carbonic acid. This is shown by the following experiments.

A. 100 grs. of the ordinary bicarbonate of the shops were added to dilute sulphuric acid: the loss by this treatment was 49 grs.

B. Another portion of 100 grs. of the same was subjected to a red heat for one hour: and lost 36 grs. The 64 grs. remaining were treated with dilute sulphuric acid and sustained a further loss of 23 grs.

The composition of the ordinary bicarbonate of soda, as deduced from this analysis, which was repeated with exactly the same result, is,

Carbonic acid,	49
Soda	41
Water	10
	100

The mean of two analyses of the salt prepared by another manufacturer gave,

Carbonic acid,	44
Soda,	41
Water,	15
	100

An examination of the salt of a third establishment noted for the purity of its preparations, yielded the same result as the first; and as this is confirmed by the experiment of the committee of the Franklin Institute, I am disposed to consider it as affording a correct view of the composition of the salt usually sold in this city.

It has become so customary to correct the results of analyses by the atomic theory, that the latter is considered a criterion of the correctness of the former. A glance at the above statement shows that it does not agree with the multiple system: and from the well established truth of that system, the fact induced a further examination. Thus, to have constituted the bicarbonate, the 41 parts would have required 56.+ parts carbonic acid, or to form the sesquicarbonate 42.+ parts of the same acid, whereas 49, the actual quantity, is almost exactly intermediate.

To determine whether the result obtained was owing to admixture of the carbonate with the bicarbonate, a portion of the recently prepared granular mass was washed with a small quantity of water, and dried at the temperature of

100° F. It was then pulverized, wrapped in blotting paper, and submitted to pressure 12 hours, in order to remove all hygrometric moisture. With it the following experiments were performed:

A. 50 grains were treated with dilute sulphuric acid: lost 26 grs. giving 52 parts carbonic acid in the 100.

B. 75 grs. tartaric acid, freed from hygrometric moisture, were added in solution to 85 grs. washed salt, also in solution. After the effervescence had ceased, the solution was heated to ebullition. On testing with litmus paper, turmeric paper browned, and turmeric paper, no immediate effect was produced; but after 24 hours' immersion, the turmeric paper had become a shade darker, showing a very slight alkaline excess. From these facts it was deduced that the salt was a perfect bicarbonate, composed of

Carbonic acid,	52.
Soda,	37.818
Water,	10.182
	100.

proving the correctness of the conjecture that the previous results were influenced by a portion of carbonate, mechanically retained. When the granular mass is removed from the apparatus to be dried, from its porous texture it retains a large portion of water, holding in solution carbonate of soda; this dries with the mass, and is thus equally distributed, reducing the relative proportion of carbonic acid. That this is the mode in which the mixture occurs, is proved by the fact that the same results were obtained, whether the granular or pulverized salt was employed.

Whether the process would not be improved by pressing the salt immediately on its preparation while still wet, or by washing it with a small quantity of water, or by a combination of these means, is left to the consideration of the profession.

Mr Philips is of opinion that the bicarbonate of soda cannot exist in a dry state, since by drying it is reduced to a sesquicarbonate. This opinion is controverted by the ex-

periments of Dr Thomson, who prepared a perfect bicarbonate, by exposing a concentrated solution of carbonate in a brewer's vat. The experiments above detailed also militate against his opinion.

There are reasons for believing that the anhydrous bicarbonate combines with water in two proportions, viz. atom to atom, and one atom to two atoms; but further experiments are necessary to decide the question. For preparing the bicarbonate the French carbonate is preferred.

Remarks on Quercia, a new Substance discovered in the Bark of the Quercus Falcata; extracted from an Inaugural Thesis by Joseph Scattergood.

The following results were obtained in a course of experiments instituted with the view of ascertaining the chemical constituents of the bark of the quercus falcata, or Spanish oak. A portion of the bark had been digested in ether, alcohol, and water successively; and all the principles soluble in these liquids extracted. The residuum was of a yellowish colour, without smell or taste. When this was well concentrated by boiling in water acidulated with sulphuric acid, in the proportion of about 2 drs. of the acid to 4 or 5 oz. of water, and the liquor filtered while hot, a large quantity of white acicular crystals was produced. By separating the first product, and concentrating, either by further boiling or slow evaporation, and digesting the remaining bark in another portion of acidulated water, an additional quantity of the same kind of crystals may be obtained. By this process I have separated as much as 70 grs. from ℥iv. of the bark.

To an acidulous solution of these crystals was added bicarbonate of soda, in sufficient quantity to neutralize the

acid, upon which a white powder subsided, which, after careful edulcoration, was inodorous, tasteless, and entirely insoluble in ether, alcohol, or water, either hot or cold. It forms the base: and, from my having obtained it from six different species of quercus, and its properties characterizing it as a substance sui generis, I have given it the name of quercia.

This substance, from its want of taste and its insolubility in the ordinary menstrua, appears to have more analogy to the earths than the alkalies; it differs from all the former at present known, by forming insoluble salts with the mineral, and *not* combining with the vegetable acids. The quantity obtained from the bark was so great that it led me to suppose I had permitted some foreign substance to be mingled with it; but the experiments have been frequently repeated upon different parcels and species, and with so much care that it entirely precludes the possibility of a mistake.

This substance unites freely with the mineral acids; but the vegetable, such as the acetic, oxalic, tartaric and citric, have no perceptible effect upon it. The sulphate crystallizes in acicular crystals, which are perfectly insoluble in ether, alcohol, water, or solutions of the neutral salts; and when carefully edulcorated with water, are not blackened by the most intense heat I have been able to apply. When thrown upon a red hot iron, its crystalline form is destroyed. It may be redissolved in boiling diluted sulphuric acid, but the greater part of it subsides again upon the solution cooling, unless it is in very small quantities. The acid solution of it is not affected by the solution of oxalate of ammonia, oxalic acid, nitrate of silver, per-chloride of mercury, tartrate of antimony, ferro-cyanate of potash, or the nitric or muriatic acids. All the alkalies, alkaline carbonates, and magnesia decompose it: quercia, in the form of a white insoluble powder being precipitated. Alcohol, when added to the acid solution, throws it down as a flocculent precipitate.

The nitrate forms lamellated crystals, which are as tasteless and insoluble as the preceding; the acid solution is not

affected by any of the reagents mentioned in the experiments on the sulphate. Quercia may be thrown down by the alkalies, alkaline carbonates, and magnesia. It is also decomposed by sulphuric acid.

The muriate crystallizes in acicular crystals, which aggregate in stars when the solution is slowly evaporated. They are also tasteless and insoluble: and the acid solution is not altered by any of the tests mentioned in the experiment upon the sulphate, except the nitrate of silver, which forms an immediate copious precipitate.

Quercia, and its nitrate and muriate, when thrown upon red hot iron, are immediately decomposed, a dark grey powder being left.

The muriate may be obtained by boiling the bark in water acidulated with muriatic acid, as well as by the direct union of its constituents.

When the bark was boiled with water acidulated with nitric acid, the acid was decomposed, and a bright yellow spongy mass was the only result. The average loss of 400 grains of barks of different thicknesses, after the action of ether, alcohol, and water, was 70 grains, but not much more than half that quantity of quercia could be obtained from each by precipitation with alkaline carbonates.

The residue, after the various operations necessary to obtain all the constituents, is a light yellowish, entirely tasteless and inodorous substance, and may probably be considered as woody fibre, nearly pure.

From the various experiments detailed in the thesis, 400 grains of the bark of the quercus falcata, or Spanish oak, of ordinary thickness, appear to be composed of

Tannin	40 grains
Gallic acid	26
Oily and resinous matter	10
Extractive	6
Quercia	70
Residue, or woody fibre	248
	400

Quercia, and its salts, from their insolubility, are not likely to prove of much medicinal importance.

I have taken upwards of 10 grains without perceiving any effect, and 3j. of the sulphate was given to a full grown dog without producing any perceptible action upon him.

Remarks on the Preparation of Blue Mass. By Elias Durand.

Different formulæ have been recommended for the manufacture of the blue pill, and several substances employed to receive and divide the mercury, such as manna, molasses, honey, conserve of roses, &c. The great imperfection of this preparation, as we generally find it, is the facility with which it becomes dry and hard. By this alteration the minutely divided particles of the metal, deprived of the former viscosity of the ingredients of the mass, unite by their mutual attraction, and form visible, and sometimes tolerably large globules; or, in other words, the mercury is revived. Thus the blue mass is so much impaired in its medicinal properties, as to be unfit for use.

This obvious defect induced me, many years ago, to perform experiments, with the view to discover some substance which, while it would extinguish the metal, would also prevent this alteration. Ultimately I found that *honey* was decidedly the best article for this purpose; nor do I hesitate to say, although it is stated in the American Dispensatory that honey had been rejected because it produced griping, that in the blue mass it is altogether harmless, being introduced in such small quantities as in no way to interfere with the ordinary action of the medicine.

The preparation, obtained by the employment of honey, possesses the advantage of keeping for years in a proper

consistence for forming pills; and the addition of some mucilage of gum arabic has enabled me, by its viscidity, to obtain a perfect mass with much less labour than any process recommended in the pharmacopœias, or any other that I have tried. Indeed, I consider my success so complete in the formation of this compound, that it affords me great pleasure to offer my formula for publication, in the expectation that it may be beneficial to our pharmaceutists.

℞.—Mercury	4 parts
Inert vegetable powder*	3 parts
Gum arabic	1 part
Liquid honey	4 parts, or nearly.

Mix the gum with half of the honey, and to this add the mercury. Let them be triturated without intermission, if possible, until no globules can be perceived by the aid of a good glass; then add the other ingredients. By proper exertion one pound of this mass may be thus prepared in the space of one hour or one hour and a half, and every three grains of it will contain one of the divided mercury.

On the Non-Existence of Oxide of Mercury in Blue Pill and Blue Ointment. By Samuel Allinson, Jun.

Since the demonstration by Lavoisier of the true constitution of metallic oxides, the pharmaceutical preparations of mercury by trituration have been considered as owing their remedial powers to the presence of an oxide, formed by a combination of the oxygen of the air with the metal. Previous to this time, I believe, from reference to some of the old dispensatories, it was not considered that any chemi-

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* The liquorice or marsh mallow root is preferable to starch. The mass prepared with the marsh mallow, in powder, possessed the finest colour.

cal change took place, but merely that the mercury was finely divided. None of the older writers speak of its conversion into a "calx."

My attention being directed to the subject, I was led to a belief that it is at least very improbable that these preparations contain any oxide of mercury.

It is a fact with which every apothecary must be familiar, that the pilulæ hydrargyri, and the unguentum hydrargyri of the shops, always contain a considerable proportion of metal which is not oxidized, visible either to the naked eye or with the aid of a microscope, and easily separable by washing away the other substances with which it is combined. He must also be familiar with the change through olive green and black to blue, of the unguentum oxidi hydrargyri rubri, with the ordinary exposure in the ointment pots of the shops*. In this state it is perfectly analogous to the blue ointment prepared by trituration. When washed with an alkaline solution, uncombined mercury separates.

The conclusion is obvious and irresistible, that if unctuous substances deoxidize the oxide of mercury, it is impossible that, by mere trituration of metallic mercury with the same substances, it should be oxidized.

Turner doubts the truth of the generally received opinion, that mercury may be oxidized by agitation with atmospheric air, and thinks it probable that its oxidation in the Ethiops per se of Boerhaave, "was solely owing to the presence of the other metals." But even supposing that mercury may be oxidized by this means, it does not render it probable that a similar change is effected in the preparation of blue mass and ointment. For 1. The conserve, honey, or other adhesive substances used in preparing the mass, and the lard in the ointment, *effectually prevent the contact of air* with nearly all the metal employed. 2. The time required for

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* When carefully excluded from light and air, this change does not take place unless resin cerate has been employed in the preparation. In one instance I observed, it appeared to be converted into a carbonate.

oxidation with free access of air* proves that this cannot take place in the comparatively short time in which these articles are prepared with an obstructed access. And 3. Admitting the formation of an oxide, it would, in the case of the ointment, be so speedily reduced by yielding its oxygen to the lard, that it could not owe to it its efficacy.

Finding that this reasoning, though satisfactory to myself, was not so to some with whom I conversed, I endeavoured, by experiments several times carefully repeated, analytically to prove its truth.

I first washed some well prepared mercurial ointment with a solution of potassa, and suffered the resulting saponaceous liquor to stand for several days to deposit finely divided mercury or oxide. Pouring off the liquor, part of the metallic residue was in running globules, and part so minutely divided as to be of a black colour. This I boiled in acetic acid, which however did not act upon it. Its colour is not a proof of its being an oxide. I have observed mercury, when sublimed in a glass vessel and washed from the sides with water, assume a similar appearance, yet remain unacted upon by acetic acid. Friction or pressure immediately converts it into globules.

The blue mass upon which I operated was from Apothecaries' Hall and William Allen's, London, and each parcel of a very excellent quality. I boiled it in successive portions of distilled water until all the soluble matter was dissolved, then digested the residue in acetic acid with heat. No acetate of mercury was formed.

If these experiments have been accurately performed, it must follow as a necessary corollary that the subjects of them contained no oxide of mercury. This fact, which is now generally admitted in France, though denied in the British and American dispensatories, overturns the long es-

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* According to Dr Duncan, the phial containing the metal upon which Boerhaave experimented, was for fourteen years attached to the wing of a wind-mill.

tablished maxim in therapeutics, that metallic mercury is perfectly inert when internally administered.

This hypothesis derived its main support from the fact that when a large quantity of mercury in the metallic form was given to overcome constipation by its gravity, it passed from the system without leaving any impression behind it. But the truth of the position might have been questioned, by recurring to the effect of mercurial vapours on looking glass makers; they being subject to salivation, though the metal is only presented in a state of minute division, the oxide not being vaporizable. It would appear, however, that although a union of oxygen with this metal is not essential to its sialagogue powers, it must be in a state of extreme comminution to insure this action, as it is well known that it was freely used in the reign of Charles II. as a cosmetic, and passed from the bowels in a brilliant and uncontaminated form without exerting any agency over the general system.

An Analytical Memoir on Tobacco. By Columbus C. Conwell, M.D.

Tobacco, whether viewed as a chief article of American export, as a staple of many of our states, or as an article of almost universal consumption, is a plant whose accurate analysis must be of the highest importance. That it contains, like opium, an anodyne substance, we have every reason to believe from its effect on organic surfaces; and that, like opium, it also contains a poisonous principle is equally demonstrable from the fatal experience of many who have taken it into their stomachs. If analysts would direct their attention to the detection and separation of these two principles, instead of labouring to ascertain the relative quanti-

ties of resin, gum, mucus, colouring matter, salts, lignin, &c. they would perform a work far more useful to medical science, more interesting to scientific men and more important to the immense multitude that use tobacco.

The few following experiments were performed with a view of advancing in some measure the knowledge of the constituents of this plant:

To two quarts of a strong infusion of tobacco leaves, three ounces of pure aqua ammoniæ were added: a copious brownish yellow cloud soon gathered and descended. This precipitate was composed of the alkaline substance which I have termed NICOTIA, slightly contaminated with other vegetable matters. Retained on the filter and dried, it assumed a purple black colour not unlike iodine, and lost the nauseous taste it possessed before edulcoration.

Nicotia is tasteless, inodorous, uncrystallizable and destructible by heat. It is insoluble in water and alcohol, and combines with the acids, forming nearly insoluble salts. The principal peculiarity of nicotia, and one sufficiently distinctive, is that of its striking with all the acids a red or light claret colour. Though many circumstances prove it to be totally distinct from lime, as its precipitation by pure ammonia, the phenomenon of its combination with the acids, the habitudes of its muriate, &c. still it must not be concealed that all its salts are precipitable by oxalate of ammonia.

After precipitating by pure ammonia, I was surprised to find my preparation in the state of carbonate, as it caused a violent effervescence with acids; but it was found that, previous to precipitation, the process of fermentation had commenced, and a portion of the carbonic acid, which was pretty copiously evolved, combined with the nicotia.

Sulphate of nicotia crystallizes in acicular fragments, insoluble in water and alcohol, and nearly tasteless.

The *hydrochlorate* aggregates in small indistinct crystals, apparently insoluble, or held in suspension like a precipitate. It has a bitter astringent taste.

The *nitrate* could not be obtained in a crystalline form.

The *tartrate* is insoluble.

The tobacco leaves, after being deprived of all matter soluble in cold water, were transferred to ether, and suffered to remain in digestion a week. On filtration and spontaneous evaporation of the ethereal tincture, a thick greenish yellow oil remained in the evaporating vessel. This oil derives its colour from the chlorophyllin of the leaves. It possesses the peculiar odour of tobacco, with an intensely acrid and loathsome taste, and most probably concentrates all the virulent energies of the plant.

Starch does not exist in the pure Virginia leaf, at least iodine does not indicate its presence in a transparent decoction of the leaves, first acted on by cold alcohol and ether; and we can only account for M. Vauquelin's asserting the reverse by supposing that he experimented upon impure tobacco.

Selected Articles.

On Plasters.

Plasters are those medicinal preparations, used externally, possessing sufficient consistence to adhere to the skin without melting, and whose base is composed of fatty substances.

Among the various compounds designated under the name of plasters, some owe their consistence to wax and resins, others to metallic oxides.

The first are simple mixtures, accomplished after the liquefaction of all the ingredients entering into their composition. The second are the result of a true combination procured by the reaction between the constituent principles of the fatty substances and the metallic oxides with which they are combined.

Some authors, and particularly those of the Batavian Pharmacopœia, have used the name of plaster where it did not properly belong*.

M. Deyeux has proposed to reserve this appellation for the designation of compounds produced by the action of greasy bodies upon metallic oxides, and to give to others the name of *solid ointments*.

M. Chéreau has proposed to range among the salts those plasters which are made with metallic oxides, and, in conformity with the principles of chemical nomenclature, has

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* Annales de Chimie. Tom. LVIII. p. 32.

called them oleo-margarites, a name indicating their composition.

M. Henry, to whose useful labours the science of pharmacy is so much indebted, has, in order to avoid the inconvenience always produced by the introduction of new words into the language of pharmacy, taken into view their consistence only, and, while preserving their name, has distinguished them as *plasters by mixture* and *plasters by combination.* The former are the *solid ointments of the codex.* The latter, plasters, properly so called. Before passing to the general rules which apply in their preparation, it will be proper to obtain a solution of the following questions:

1. Among the greasy substances and the metallic oxides, which are those best adapted for combination, and consequently for the formation of plasters?

2. What are the degrees of temperature that ought to be observed?

3. What signs indicate the completion of the process?

4. What are the phenomena that occur during their preparation, and what is their nature?

5. What alterations are these compounds liable to undergo, and what are the means of preventing them?

M. Henry, in an essay read before the Societé de Pharmacie, has described with great precision those oily substances and metallic oxides best calculated for the preparation of plasters; and from his experiments he has drawn the following conclusions:

Among the fatty bodies, olive oil is the only one proper to be combined with metallic oxides. Of all the metallic oxides, those of lead are alone adapted for combination with greasy or fatty substances.

Litharge (protoxide of lead melted) *is the only oxide of that metal which forms a good plaster.*

The English litharge should always be preferred.

The experiments which induced M. Henry to admit the above results were performed with the oils of carnation and the castor bean, upon the English litharge, upon that of

Hamburg, upon the red oxide of lead (deutoxide or minium), the yellow oxide (massicot), and finally, upon the oxides of iron and manganese.

Of the degree of temperature to be observed.—The degree of heat requisite in the formation of plasters, varies according to the nature of the preparation. In the preparation of those by simple mixture, a low temperature should be employed, sufficient only to liquefy the fatty and resinous substances. For if the fire be not conducted with caution, a part of the mixture will be burnt, or its consistence changed; a result depending upon a partial decomposition of its constituents, or a separation of some volatile principle; thus, for instance, in preparing a plaster at too elevated a temperature, of which turpentine forms an ingredient, or any other resin containing a volatile oil, the latter will be disengaged, and the resin becoming more solid, the consistence of the plaster will be increased. In preparing plasters by combination or chemical union, two different degrees of heat are employed: the one equal to that of boiling water—the other superior to it. In the latter case the object is to carbonize a part of the fatty substances. These bodies are heated over the naked fire, and the metallic oxide added in a state of minute division, in order that the combination may be speedily effected; because a certain quantity of separated carbon might occasion the reduction of the metal. When it is desirable to prepare a plaster without its component parts undergoing this alteration, the reaction of the ingredients is facilitated by submitting them to the temperature of boiling water; and this may be best effected by pouring water into the vessel employed in the operation. The particles of the mixture are thus kept in motion by the ebullition of the water, and prevented from coming in contact with the bottom of the vessel. The water is an intermediate substance, performing the function of a bath.

Of the signs which indicate when plasters are finished.—*Plasters by mixture* are finished when all the substances

which compose them are liquefied, and present a homogeneous mass.

With respect to those which are the result of combination, the criteria are as follows: 1st, when the metallic oxide has entirely disappeared; 2d, when the colour of the plaster has undergone a complete change from that of the oxide; 3d, when the consistence is such that a perfect plaster can be formed when thrown into water, without its adhering to the fingers.

The consistence of the former depends upon the nature and proportions of the substances employed. That of the latter, from new combinations effected by the change which occurs during the reaction of the ingredients. Both should readily soften between the fingers, and when applied over the palm of the hand, should adhere to it, and afterwards be detached without leaving behind a trace of plaster. They should also require for their liquefaction a greater degree of heat than naturally exists in the parts which they are destined to cover.

Of the composition of plasters by combination, and the phenomena which present during their preparation.—The formation of these plasters ought to be regarded as a saponification, the litharge having upon grease and oil an action analogous to that of soda and potash upon fatty bodies. There result from this action the stearic, margaritic*, and oleic acids, and glycerine.

The acids unite with the oxide of lead, and form salts; the glycerine remains in solution in the water which has served as a bath during the preparation of the plaster. It has been observed that the presence of air is not essential to the production of these phenomena, which may occur in vacuo. The same cannot be said of water; it is indispensable for the saponification of the greasy bodies.—(*Vide the work of M. Chevreul, Paris*, 1823†.)

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* If olive oil be used, the production is stearic and oleic acids, and glycerine.

† Attempting to form lead plaster, the emplastrum plumbi of the pharmacopœia,

By treating simple plaster with very dilute nitric acid, at a gentle heat, it will appear that it is a compound resulting from the union of acids with the oxide of lead. The latter is dissolved by the acid, and the acidified grease separated, which may afterwards be reunited to the oxide without the intervention of water. The remark of M. Henry, that minium would not answer for the preparation of plasters of a good consistence, is easily explained from the following observations:—M. Chevreul regards the fatty substances as composed of oxygen, hydrogen, and carbon, in such proportions that one part of their elements represents the greasy acids, whilst the other portion, separated by water, represents the glycerine. When these bodies are submitted to the action of a salifiable base sufficiently energetic, the equilibrium of their elements is destroyed. The alkaline power determines acidity in one portion of the mass of saponifiable substances, whilst the remainder of the compound, by mixing with water, constitutes glycerine.

The acids produced unite with the oxides and form salts with a base of lead; and, as this metal only unites with the acids in the state of a protoxide, a salt with such a base is readily obtained by the union of *this* oxide with a fatty body, which constitutes *simple plaster*.

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without the use of water, steam being the source of heat, I was surprised to find, after several hours, during which time the litharge and oil had been kept at a temperature of 220°, or thereabouts, and constantly stirred, not the slightest appearance of combination: upon the addition of a small quantity of boiling water, the oil and oxide immediately saponified; water appeared, therefore, to be essential to the formation of the plaster. It also appeared probable the oxide might be in the state of hydrate; to ascertain if such were the case, I precipitated, by potash, the oxide from a quantity of acetate; the precipitate, when washed, was dried by a heat of 220° till it ceased to lose weight; one hundred grains, heated to redness in a tube, gave off nearly eight grains of water, and assumed the orange colour of litharge; the recently precipitated oxide was therefore, no doubt, a hydrate; part of which, with somewhat less than two parts of olive oil, without any addition of water, at a temperature of 212°, formed, in half an hour, perfect plaster. Each of these experiments has been repeated, with precisely the same results. I am induced to mention this fact, because all pharmaceutical writers limit the action of water to that of keeping down the temperature.—*Journ. Royal Institute, January* 1826.

Alterations which plasters undergo by age.—When plasters have been prepared for some length of time, they change their colour and harden. Sometimes they become friable, but more frequently this effect occurs only at the surface, which protects the interior from any change.

It has been observed that simple plaster becomes yellow at the surface, the divine plaster black, the emplastra diabotana covered with crystals*. These alterations being the effect of the action of the atmosphere, it is necessary, as much as possible, to prevent their coming in contact with it.

Plasters, which have undergone these alterations, have lost nothing of their medicinal properties. They may be used by separating the part which has become hard; or by melting them over a gentle fire and adding oil in sufficient quantity to restore their consistence. This addition will render them suitable for use.

The following rules ought to be observed in the preparation of different kinds of plasters:—

1. To ascertain the purity of the litharge, and to reduce it to a very fine powder.

2. In preparing plasters by combination, which are not intended to be burnt, caution must be observed to have in the vessel a sufficient quantity of water, destined to serve as a bath.

3. The form of the vessel used should resemble that of one-half of an egg-shell, cut transversely.

4. To facilitate the combination between the oxide and the fatty body, continual stirring with a spatula is necessary, thus holding the metallic oxide in suspension.

5. In preparing *burnt plasters*, a slight carbonization must be effected, and the fire conducted with caution after the addition of the oxide.

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* M. Richard Dupral has recognized the presence of nitrate of potass on the surface of this plaster. MM. Henry and Blondeau have obtained sulphur and benzoic acid. It is probable these products, dissolved in the water, are brought to the surface by means of that vehicle.

6. In *plasters by mixture* gum resins must be dissolved in vinegar or weak alcohol, and the solutions evaporated to the consistence of thick honey.

7. Resins must be reduced to powder previous to their admixture with other substances, to prevent the mixture from becoming lumpy.—Mercury must be extinguished by the aid of turpentine.—Extracts must be dissolved in water.

8. Volatile oils, camphor, and aromatic powders, to be added only towards the end of the operation.

9. Any deposit from fresh plants, if such enter into the composition, must be separated from it.

10. The plaster to be well pulled and worked with the hands, to obtain it homogeneous in all its parts.—*Dictionnaire des Drogues.* C. E.

On the Upas Antiar and Upas Tieuta.

We are informed by M. A. Richard, in the Journal de Chimie Medicale, de Pharmacie et de Toxocologie, that we are indebted for the first correct accounts of the trees producing these poisons, and the modes employed by the Javanese in preparing them for use, to M. Leschenault, naturalist to the French expedition under captain Baudin, and to Dr Thomas Horsfield, naturalist and physician to the government of Holland in Java. Both of these gentlemen resided some time in the island, and the former published, on his return to Paris, an account of the trees in the *Annales du Muséum d'Histoire Naturelle*, and sent some of the poisons to MM. Magendie and Delile, who ascertained by experiment their action on the animal economy, which they made public. Dr Horsfield published his description in the

Transactions of the Society of Batavia. These are the sources from which the following facts are drawn.

The *upas antiar* is known at Java under the name of *oupas antschar*, and stated by M. Leschenault to belong to the family *urticées*, to which he gave the name of *antiaris toxicaria*.

This tree acquires colossal dimensions in the forests of that island, is surrounded by every species of vegetation, and covered by innumerable insects, which experience no inconvenience from its poisonous proximity. This does not accord with the fables of former times, that it was always found solitary, poisoning the atmosphere to a certain distance, and causing death to every living thing that approached within the sphere of its destructive influence. Its trunk produces large excrescences similar to those of the *canarium commune*. The leaves are alternate, oval, petiolate, coriaceous, of a pale green colour, and covered with short rough hairs. The flowers are *monoiques*. The male flowers are united on a common receptacle, hemispherical, pedunculated and axillary; they are separated by numerous imbricated scales.

The female flowers are solitary, and almost sessile at the axilla of the leaves; numerous imbricated scales cover the ovary, which is surmounted by two stigmata. The proper juice contained in the bark of the antiar is very viscous, and possesses a bitter taste; drawn from the trunk, it is of a yellow colour, while that furnished by the youngest branches is white. Individuals, according to their susceptibilities (as is the case with other poisons), are affected differently by its odour; to some it is prejudicial, while over others it exerts no influence. The principal locality of this tree is at the oriental extremity of Java; it is also found in the islands of Borneo, Sumatra, and Bali, where its poison is called *ipo* or *upo*. According to Dr Horsfield, the Javanese adopt the following mode for preparing the poison of the upas antiar. They collect eight ounces of the juice in the evening, and inclose it at once in a tube of bamboo; this they

afterwards put into a proper vessel, and carefully mix with it the expressed juices of the following articles, well triturated together:—*arum nampoo* of the Javanese; *kempferia galanga*, L.; *amomum zerumbet*, L.; onion and common garlic, of each half a drachm. To this they add an equal quantity of powdered black pepper, agitating the mixture, and subsequently a single grain of *capsicum fructicosum* is placed in the midst of the mass. This grain produces an immediate action, occasioning an apparent agitation on the surface of the liquor, sometimes at the sides, sometimes in the middle of the vessel, for about one minute. After this has subsided, they add the same quantity of pepper and another grain of *capsicum*, from which there results an analogous action, but less in degree, to that which took place in the first instance. A third addition of these peppers is finally made in the same proportions, and after all movement has ceased, and the surface of the mixture presents the appearance of a circle in the shape of an areola, the operation is concluded, and the poison prepared. The preparation of poisons is a particular art in Java, known only to a few obscure individuals, who inhabit the gloomy and mountainous recesses of the island. In general they preserve the antiar in branches of the tubular bamboo, exactly closed at each extremity, and varnished with resinous substances. When exposed to the air it rapidly decomposes, but by being thus enclosed, in sealed tubes, it preserves its original activity for a great length of time, as was ascertained by MM. Magendie and Delile, in their experiments on that which was brought from Java by the French naturalist.

Upas tieuta. This poison, called by the natives *tshettik*, we are told, by Dr Horsfield, is still more poisonous than the preceding, and is the product of a large branching or climbing shrub. The fructification of it is unknown, but M. Leschenault has recognized it as belonging to the genus *strychnos*, and described and figured it under the name *strychnos tieuta*. The roots of this shrub extend themselves

horizontally, sometimes to a very considerable distance, while the stem twines itself round the loftiest trees, reaching from the base to the summit. The small branches are opposite on the stem, long, twisted, cylindrical, diverging, and bearing the leaves, which are also opposite, oval, lanceolate, entire, glabrous, and acuminated.

The tieuta is by no means abundant, and grows in deep and shady forests.

To prepare the poison, the root is taken up and washed, deprived of its bark, and subjected to the action of water kept at the boiling point for about one hour. The liquid is then carefully filtered through linen, and again placed over the fire, where it is evaporated by gentle heat to the consistence of a soft extract. To this the expressed juices of arum, galangal, onion, garlic, &c. are added, with the pepper in powder. The mixture is to be placed over the fire for a few minutes, and the process is completed.

The Javanese employ these preparations indifferently to poison their arrows for war or for the chase. The flesh of animals thus killed contracts no deleterious properties, provided the part is immediately separated into which the arrow has sunk.

Although death follows very rapidly from the introduction of these two poisons, yet their mode of action is very different, as has been shown by Magendie and others. The *antiar* acts like all the other acrid narcotic poisons; it is absorbed, enters the circulation, operates on the brain and spinal marrow, and frequently occasions all the effects of emetic substances. The *tieuta*, on the contrary, is indebted for its powers wholly to the strychnine which it contains, and its terrible effects are produced altogether through the medium of the spinal marrow. Tetanus, paralysis of the thorax, and asphyxia succeed, and occasion the death of the animals subjected to its influence. No trace of strychnine is found in the antiar, and as was before observed, its action on the animal economy is milder than its associate. B. E.

New Process for extracting the Volatile Oil of Copaiva, and for saponifying the Resin at the same time.

In the Journal de Pharmacie for February 1829, M. F. E. Ader offers some remarks upon the inconveniences of the process of distillation, the only one heretofore employed for the separation of the volatile oil from the resinous fluid copaifera officinalis, and then proceeds to the detail of experiments which have induced him to adopt a different mode.

The objections to distillation are, that if the vessels employed are metallic they become tarnished, contract a very offensive odour, and are for a long time unfit for any other purpose. If on the other hand the apparatus be glass, although it can be readily cleansed, yet, the time, fuel and attention necessary to conduct the operation, render it expensive, especially where large quantities are subjected to decomposition.

It was by observing the effects of alkalies upon volatile oils at different temperatures, that M. Ader was led to infer the possibility of separating many of these substances from the original compounds. He acknowledges himself indebted in his first experiments to M. Planche, and while he conceives that by this mode the oil of copaiba may be prepared more promptly and more economically than by distillation, it offers a convenient mode for analyzing many resinous fluids when it is desirable to ascertain their purity, as well as for preparing the soap of the resin of copaiba.

Introduce into a matrass, of the exact size to contain the liquids, 100 parts of alcohol by weight (sp. gr. .837), 100 parts of copaiba, and agitate them well together; then add $37\frac{1}{2}$ parts of solution of caustic soda (sp. gr. 1.333); shake them again to assist the saponification of the resin; add also 150 parts of water; agitate gently and cork the vessel; invert it several times and set it aside to rest. Immediately small globules of essential oil will be seen suspended in the liquid;

after the lapse of two or three hours, the mass becomes separated into two distinct strata. The upper, scarcely coloured and very fluid, occupying the neck of the matrass, is the volatile oil. The lower, of a yellowish amber colour, perfectly transparent, is the saponified resin, dissolved in weak alcohol. Separate the oil by means of a little pipe or syphon, and set it aside in a suitable vessel to deposit the water with which it was mixed; afterwards decant and filter it. It ought to produce $\frac{44}{100}$ of the copaiba treated. Thus prepared, it is of a greenish hue, a little less fluid, and with less disagreeable odour than that obtained by distillation: but like that it is very limpid, of specific gravity .900 at 15 degrees centigrade; its taste slightly pungent and bitter. It is soluble in water, more soluble in alcohol, but less so than the copaiba itself.

To obtain the soap, evaporate the lower stratum in a porcelain evaporating dish to the consistence of honey. Separate the excess of alkali, by a saturated solution of hydrochlorate of soda. Decant the liquid, wash the residue, and subsequently drain off all the water. Then dissolve in alcohol, and evaporate or distil until a solid product is obtained; which will be the true saponified resin of copaiba. It has a yellow colour and is very transparent. Its odour is less than that of copaiba, but its taste is decidedly more bitter and austere. It is soluble in twelve times its weight of water, at 15 degrees centigrade, whilst three parts are sufficient at 100 degrees. Its remedial properties ought to be much more active than copaiba on account of its great solubility. It rests with the physician to appreciate its value.

This soap has some resemblance to a preparation used in London for some time, and known under the name of soluble resin of copaiba. It has been employed with success by some practitioners in cases where copaiba is prescribed.

It appears that M. Morson, who is the author of it, prepares it by the immediate union of caustic soda, with the resin of copaiba, deprived of its volatile oil by heat. A small quantity prepared by this pharmacien was sent to M. Planche.

Its colour is a reddish brown, transparent, almost entirely deprived of the smell of copaiba, though its taste is much more distinct. It is slightly soluble in water, at a temperature of 100 degrees centigrade.

The preparation appears to be nothing more than the resin of copaiba, of which a part is imperfectly saponified. The product of the above process appears in every respect preferable to it. C. E.

Selections from Faraday's Chemical Manipulation.

[Continued from page 51.]

When oxidized and foul copper, such as wires, plates, &c. are rubbed clean by sand-paper, a subtle cupreous dust is diffused through the air, which is exceedingly unpleasant in its effects upon the mouth and nostrils. It is better in such cases to use a little water with the sand-paper; the copper is more readily cleaned, and all unpleasant effects are prevented. Foul copper-plates may be cleaned also by putting them into the furnace and heating them to redness for five minutes, with access of air, so as to allow the formation of a coat of oxide upon them, and then plunging them in water. The oxide scales off, or may easily be separated by bending the plate, and leaves the latter clean and metallic.

Porcelain and other mortars should be kept in good and clean condition; dry pulverizations frequently fill the minute irregularities of the inner surfaces with the substance pulverized, so that even after careful washing, portions still remain behind. This may readily be observed with coloured bodies, as oxide of iron, Prussian blue, vegetable substances, &c. A little sand and water put into the mortar and rubbed with the pestle over all the contaminated parts, cleans them and the pestle itself so far, that the affusion of water is suf-

ficient to wash off all impurities. In some cases, sulphuric or nitric acid, or solution of alkali, must be used; their action is always facilitated by rubbing a little sharp sand in the mortar with the pestle.

Adhering dirt and dust, as well as the thin films of oxide and other impurities which attach to mercury, may be removed in several ways. A very common method is to fold a piece of paper into a cone, so as to make it nearly tight at the apex, and to pass the mercury through it as through a funnel. The aperture at the bottom may be made larger or smaller by a little management of the paper: when the inward fold is pulled upwards, it increases the aperture below, whilst pulling the outer fold upwards a little, tends to close it. The aperture may also be opened or closed more or less by applying the finger to it. The mercury as it runs through should be received in a glass or other proper vessel, and the last portions reserved in the cone; they will be found to abound with scum and other impurities, a portion of which might pass out with the metal. It is better to put these latter portions by themselves, and when they have accumulated, to purify them altogether. This method of cleansing mercury is a ready and sufficient one in numerous cases where it is only the adhering dirt that is to be removed.

Mr Millington recommends that the mercury should be cleansed from mechanical dirt by being filtered through the pores of a piece of hazel wood by means of atmospheric pressure. Others squeeze it through a piece of shamois leather. But when cleaned by any of these methods, a film still generally adheres to its surface; and the metal when agitated has a scum formed upon it, especially when chemically foul. Much assistance in removing this exterior scum and dirt is gained by pulverizing some loaf sugar, putting it into a bottle with the mercury to be cleansed, and agitating them well together. The sugar should be damped, which may be done by breathing into the bottle two or three times; by agitation it then adheres to the dirt with

the mercury, and the latter being removed by passing it through a paper funnel, is obtained in a state of great comparative cleanliness.

The *chemical impurities* of mercury consist of certain metals, such as lead, tin, zinc, &c. These interfere chemically when the metal is to be used in forming combinations; and from the rapidity with which they oxidate and produce films on the surface, interfere mechanically in its uses in the bath, in certain electro-magnetic experiments, and in the construction of thermometers and barometers. Mercury which is chemically impure will soon acquire adhesive films on its surface, even when cleansed of mechanical impurities, and with a rapidity dependent on the agitation of the metal or extension of its surface.

The first method of purifying mercury from these metals is by distillation. The operation should be performed in an iron retort, a portion of clean iron and copper filings having been introduced with the mercury, which should be condensed and received in clean water. Although this is an excellent process generally, yet it is by no means unobjectionable, for both zinc and arsenic will pass over, and these metals are not uncommonly introduced in experiments at the mercurial trough.

A very useful method of cleaning considerable quantities of trough mercury is to put from half an inch to an inch in depth into a large earthenware pan, and to pour over it sulphuric acid diluted with twice its weight of water. The surface of contact, and consequently of depuration, is thus rendered very large. The substances should be left together for a week or two at common temperatures, being frequently agitated. At the end of that time the metal and the acid are to be separated, the latter preserved for a similar operation at some future period, and the former washed, dried, and cleansed mechanically, as already described. The sulphuric acid acts more readily if a little sulphate of mercury be added to it; the residue of a process for the preparation of sulphurous acid from sulphuric acid and mercury may

be used for the purpose without farther preparation. This residue is not an uncommon one in the laboratory, and being put altogether into the pan, the mercury, the sulphuric acid, and the sulphate of mercury, will each be economically and usefully disposed of.

An acid solution of nitrate of mercury left upon the trough metal in a manner similar to that just described, will also cleanse it to a great extent from other metals. The solution need not be very strong, or in large quantity; a week or two at common temperature is sufficient for the purpose. The solution when poured off should be reserved apart from other nitrate of mercury, for this particular use; the impurities which it has received from the metal, and for which it has rendered up an equivalent portion of mercury, rendering it unfit for any other than very ordinary purposes.

These chemical cleansings of the trough mercury are intended to destroy the disposition which exists in impure mercury to form films upon its surface. The films are produced by the oxidation of a very minute portion of the impure metal; they do not consist of oxide alone, but of metallic matter adhering to it, which being enveloped by the film of oxide, is prevented from coalescing with the fluid metal beneath, and is equally injurious in its effect as if it were also extraneous matter. Whenever the surface of filmy mercury is extended or removed, the film from the neighbouring parts rapidly expands over the newly exposed portion, just as a drop of oil extends and expands itself over the surface of water. This may be observed and understood by moving a card over the surface of such mercury from one side to the other: the film will be collected on the one side of the card, and the recent surface on the other will become covered by an extension of that which is on the metal immediately in its neighbourhood. If the operation be repeated, still the renewed surface will be re-covered, and thus a large quantity of film may be collected which if examined appears to consist for the greater part of metallic mercury. And though after many operations of this

kind the surface of the metal will be much cleaner than at first, yet exposure to the air for a while, especially if aided by agitation, will soon bring the surface into its first dirty condition, and this will continue so long as the mercury contains metallic impurities.

Small quantities of mercury, as for instance a pound or two, may be purified upon particular occasions by very ready and simple processes. Dr Priestley's* method is a most excellent one, and highly worthy of attention. So much foul mercury is to be put into a ten or twelve ounce stoppered bottle as will occupy about a fourth part of its capacity, the stopper to be put in, the bottle inverted, and being held in both hands is to be shaken violently, the hand that supports it being generally struck against the thigh. After twenty or thirty strokes the stopper is to be taken out, and the air in the phial changed for fresh air by blowing in to it with a pair of bellows. The mercury will soon become black, and a quantity of the upper part will appear as if it were coagulated, so as to be easily separable from the rest; the phial is then to be inverted, and the mouth being covered with the finger, all the metal that will flow easily is to be poured out, and the black coagulated part put into a cup by itself; by pressure with the finger this may easily be separated into running mercury and black powder, the former, with the rest of the metal, is then to be returned to the bottle and agitated as before. This process is to be repeated till no more black matter separates, and it is not a little remarkable that the operator will be at no loss to know when that is the case, because the whole of the mercury becomes pure at once; and Dr Priestley observes, that "whereas, while the lead was in the mercury, it felt, as I may say, like soft clay, the moment the lead is separated from it, it begins to rattle as it is shaken, so that any person in the room may perceive when it has been agitated enough."

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* Experiments and Observations on Air, vol. iv. section xvi.; or abridged edition, iii. 439.

Mercury purposely rendered impure by lead and tin was found to be perfectly purified by this process.

Another method is to put the mercury to be cleaned into a bottle, to add a little nitrate of mercury or a small quantity of diluted nitric acid, to agitate well for a minute or two, then to wash off the soluble parts with any portion of yellow powder formed, and to dry the mercury with a cloth. If any difficulty should occur from the separation of the mercury into an infinity of globules, which may proceed so far at last as, with the intervening water, to give the whole a soft solid appearance, it is easily overcome by drying the mercury after it is well washed, in a Wedgewood basin by heat. As the water evaporates, the globules of mercury will run together, and the metal will be obtained in its clean and pure state.

After any of these processes, the adhering dust should be removed by passing the metal through a paper cone or funnel.

The tests of the purity and cleanliness of mercury are, the absence of all film or powder when a portion is shaken quickly for a moment in a clean tube or bottle; the freedom of its motions upon the surface when agitated; the extreme mobility of its globules when a little is poured into a clean dish and broken into small parts; the perfect rotundity of form at the receding edge when a portion is made to flow from side to side of a glass dish or other clean vesssel; the largeness of the depression which exists, when it is put into a dry bottle, between the sides of the glass and the metal at the surface of the mercury; and the ready pointing of a small magnetic sewing needle when laid upon its surface out of the magnetic meridian.

When mercury has been purified and cleansed for very particular experiments, as those relating to the barometer and thermometer, extreme care is required that its surface be not soiled by any portion of dirt from the hands or the vessels used. The smallest quantity of greasy matter, or of deliquescent, or animal, or vegetable substances soluble in

water is enough to render it improper for these uses: it is rapidly diffused by motion over the whole surface of the metal, and even a touch with the finger is sufficient to communicate so much impurity as to render the mercury inapplicable in the construction of accurate instruments.

A glass should always be appointed and kept in one particular place to receive any residual portions of mercury that may be left in an impure state after experiments, or gathered from the table in a dirty condition. They are thus saved and accumulated, and when in considerable quantity may be freed from mechanical impurity by washing, and then be purified by any one of the methods described which may be most applicable. In this manner a continual saving of metal is effected to a great extent; the quantity thus returned to the trough in an active laboratory in the course of a year being very considerable.

General rules for young experimenters.

Besides the numerous directions which occur throughout the preceding pages, there are certain general precepts and rules, the observance of which will be found of great service not only to those who are commencing the practice of experimental inquiries in chemistry, but likewise to such as, having made some progress, have indulged themselves in irregular habits. They all relate to *method*, that great source of facility and readiness which is equally influential in the performance of the most common and the most difficult processes. Such as are here given have been proved by long trial: it is not supposed that they include all that are advantageous, but they are all that suggest themselves to the mind of the author as worthy to be classed together for their general usefulness. Those who may add to them will deserve the thanks of the practical chemist.

A particular and convenient part of the laboratory tables should be appointed for all general operations of experiment. It should be considered as a place intended for working only, and should not be encumbered by things carelessly laid

upon it: it should be understood that every article placed there by the experimenter is sacred for the time; that no apparently dirty glass or useless bottle is to be removed, nor any arrangement upon it disturbed by others who may be in the laboratory, but that all is to be left until the experimenter himself has disposed of them or given special directions to that purport. It is desirable in a long course of experiments that this place should be cleared as much as possible every evening, that it may be ready the next day for further progress, but unless this be done by the experimenter, or under his particular directions, it should be left untouched.

By the side of this portion of the table should be another, appointed to receive apparatus, bottles, and other articles that are done with. The putting of a thing here should be considered as a direction that it may be cleansed and restored to its proper place. The experimenter will do well to disembarrass his part of the table during his pursuits by moving his dirty glasses, waste precipitates and mixtures, and every thing for which he has no further present use, to this place, that they may be taken away. It is convenient that a wooden tray should remain on the spot, which, when filled with dismissed apparatus, may be at once removed towards the sink and replaced by another.

The laboratory note book, intended to receive the account of the results of experiments, should always be at hand, as should also pen and ink. All the results worthy of record should be entered at the time the experiments are made, whilst the things themselves are under the eye, and can be re-examined if doubt or difficulty arise. The practice of delaying to note until the end of a train of experiments, or to the conclusion of the day, is a bad one, as it then becomes difficult accurately to remember the succession of events. There is a probability also that some important point which may suggest itself during the writing, cannot then be ascertained by reference to experiment, because of its occurrence to the mind at too late a period.

The account of the days' experiments should always be prefaced by noting down in the book the day, month, and year; and if the experiments relate to gaseous manipulation, the height of the barometer, and the temperature of the laboratory.

On commencing the examination of a substance of unknown nature, the experimenter should first proceed to the most general and instructive experiments, and then to those which are more particular. He should therefore apply heat to the substance contained in a tube, and remark whether it fuse or volatilize; he should then heat it in the air upon platina foil, observing whether it will burn or not, whether it will evolve fumes, &c. Afterwards it should be heated in water in a tube, and observed whether it be soluble; and then trials should be made to ascertain if it be sapid, if it be soluble in alcohol, &c. These general examinations will soon indicate to what class of bodies the substance belongs, and will point out the particular train of investigation it may require; after which the substance may be dissolved by acids or alkalies, or any other proper solvent, and its properties more minutely ascertained.

When a substance has been brought into solution, and its relation to various tests and reagents is to be considered, it will be proper to proceed methodically in examining the different substances eliminated by their action, and not to wander from one to another. The examination of the first product or educt should be completed before proceeding to that of a second, unless indeed it be expected that a particular trial of one will throw light upon the nature of another. Generally speaking it is best to pursue the precipitates, reserving the remaining solution until these are examined. Thus if an ore be dissolved in an acid, and the solution be precipitated by potassa, the precipitate should in this method be examined before the remaining solution. If this precipitate require solution in an acid, and precipitation by peculiar tests, the first precipitate it affords should be examined and decided upon, and then the solution contain-

ing the remainder resumed, and its nature made out. This done, and consequently the whole of the original precipitate dismissed, the solution which remained when it was thrown down by the potassa is to be resumed, and treated with other agents. Perhaps carbonate of ammonia may be applied, and cause a second precipitate from it which is as before to be examined previously to the solution yielding it.

On other occasions, the solutions may be investigated before the precipitates. This plan indeed may be followed generally, and possesses the advantage of supplying the experimenter with occupation in the solution whilst his precipitates are washing. The rule intended to be impressed is, that the one or the other of these plans should be adopted as a constant practice; a deviation from which is to be resorted to only when it is considered as offering peculiar advantages.

A plan of this kind renders the notes of the experiments also more methodical. The different solutions and precipitates may be referred to by letters, as is usual in describing analytical process. Thus in the instance quoted, the original solution may be called *a;* the precipitate by potassa, *b;* the remaining solution, *c;* the solution of the precipitate, *d;* the precipitate from it, *e;* and the solution with the rest of the precipitate *b*, *f*. The solution *c* being then resumed, the precipitate by carbonate of ammonia will be *g*, and the solution remaining, *h*.

When the substance to be examined is small in quantity and rare, those experiments must be first made that will not prevent the performance of others. The action of heat, of water, and of alcohol, upon a substance may be observed, and still leave it in a proper state for other experiments, as those of solution and precipitation. The same portion of water which has been tested for sulphuric acid by nitrate of baryta, may after filtration be tested for muriatic acid, by nitrate of silver; whereas if muriate of baryta had been used in the first place, the second trial would have been impossible.

New, important, and uncertain or unexpected results, are to be repeated once or twice, that no doubt may exist at a future period, as to the accuracy of the notes which have been made at the time of observation.

When a long series of experiments with the spirit-lamp is in progress, a candle or lamp continually burning should be at hand.

On examining a mineral water by precipitants, the glasses used should be placed in a row, each before the precipitant which has been added to the water it contains: and they should remain for half an hour, that any ulterior indication of the test may not be overlooked, and without risk of mistaking one glass for another.

Every substance or glass that is entirely done with, should be dismissed, and placed at once on the tray of dirty articles.

Besides the working place, another, unconnected with the busy part of the laboratory, should be appointed, from which nothing is to be removed without the experimenter's direction. There are many occasions on which experiments or solutions are to be placed aside for a week or two, to be again resumed. These should be labelled, and put into a place which, from previous appointment, is considered as containing nothing that may be disturbed. In this way the experimenter will often avoid the disagreeable circumstance, of finding that what he intended to reserve for future examination, has been dismissed to the sink or the dust-hole. A third place of this kind may be appointed in a cupboard, out of the way, for the reception of experiments that require weeks or months for their performance, or for things that cannot be resumed before long periods have elapsed.

All products, educts, precipitates, or solutions, that are set aside for some time, should be labelled, and referred to by their names or marks in the note-book. Thus the precipitates and solutions before spoken of should have labels, *a*, *b*, *c*, &c. on the glasses or bottles containing them. When the products are new and important this should be

done immediately, that no possibility of mistake from delay may be allowed to occur. The use of gummed or pasted paper removes all trouble from this operation.

Finally, the general rules for cleanliness and order so often inculcated, are to be attended to. This subject cannot be better closed than by the very excellent observations of Macquer on this subject. He says, "A persuasion must exist that arrangement, order, and cleanliness, are essentially necessary in a chemical laboratory. Every vessel and utensil ought to be well cleansed as often as it is used, and put again into its place; labels ought to be attached to all the substances, mixtures, and products of operations which are preserved in bottles or otherwise; these should be examined and cleansed from time to time, and the labels renewed when required. These cares, although they seem to be trifling, are notwithstanding the most fatiguing and tedious, but the most important and often the least observed. When a person is keenly engaged, experiments succeed each other quickly; some seem nearly to decide the matter, and others suggest new ideas; he cannot but proceed to them immediately, and he is led from one to another; he thinks he shall easily know again the products of his first experiments, and therefore he does not take time to put them in order; he prosecutes with eagerness the experiments which he has last thought of, and in the mean time the vessels employed, the glasses and bottles filled, so accumulate that he cannot any longer distinguish them; or at least he is uncertain concerning many of his former products. This evil is increased, if a new series of operations succeed, and occupy all the laboratory; or if he be obliged to quit the place for some time, every thing then goes into confusion. Hence it frequently happens that he loses the fruits of much labour, and that he must throw away almost all the products of his experiments.

"The only method of avoiding these inconveniences is to employ the cares and attentions above mentioned. It is indeed unpleasant and very difficult continually to stop in the

midst of the most interesting researches, and to employ much valuable time in cleaning and arranging vessels and attaching labels. These employments are capable of cooling and retarding the progress of genius, and are tedious and disgusting: but they are nevertheless necessary. Those persons whose fortunes enable them to have an assistant operator, on whose accuracy and intelligence they can depend, avoid many of these disagreeable circumstances; but they ought nevertheless to attend to the execution of these things. We cannot depend too much on ourselves in these matters, however minute, on account of their consequences. This becomes even indispensable when the experiments are to be kept secret, at least for a time, which is very common and often necessary in chemistry.

"When new researches and inquiries are made, the mixtures, results, and products of all the operations ought to be kept a long time well ticketed and noted. It frequently happens that at the end of some time these things present very singular phenomena, which would never have been suspected. There are many beautiful discoveries in chemistry which were made in this manner, and certainly a much greater number which have been lost because the products have been thrown away too hastily, or because they could not be recognized after the changes which happened to them*."

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* Dictionnaire de Chimie, par Macquer, ii. 486.

Table of the Quantity of Volatile Oils yielded by different Plants.—By C. Recluz, Pharmacien of Paris.

PLANT.	PART USED.	QUANTITY OF VOLATILE OIL OBTAINED FROM 25 POUNDS.	COLOUR.	OBSERVATIONS.
Amygd. com. var. amar.	Dried seeds	6 drs. 34 grs. (Ittner.)	Golden yellow	Liquid, crystallizable, heavy, bitter, containing Prussic acid, becomes brown or violet coloured with age.
Pimpinella anisum	Fresh seeds	8½ oz. to 9 oz. 7½ drs.	Yellowish	
	Dry seeds	12 oz. 4 drs.	Yellowish	Composed of ¾ of a liquid and ¼ of a concrete oil.
Citrus bergamia	Fresh skins of 702 fruits	5 oz. 3 drs.	Citrine colour	Very fluid, deposits albumen in growing old, and becomes yellow (expressed).
Anthemis nobilis	Fresh flowers	1 oz. 4½ drs.	Sapphire	Becomes yellow with age.
	Fresh flowers	4 drs. to 5 drs. 45 grs.	Blue	
Laurus cassia	The bark	5 drs.	Golden yellow	
Laurus cinnamomum	The bark	6¼ oz. to 7 oz. 7 drs. (Cartheuser.)	Golden yellow	
		7 oz. 6½ drs. (Newman.)	Golden yellow	
Carum carvi	Fresh seeds	1 lb. 2 oz. 6 drs.	Pale yellowish	
		12½ oz. to 1 lb. 4 oz. 6 drs.	Pale yellowish	
Citrus medica	Fresh skins of 630 fruits	4½ oz. (by distillation.)	Citrine	
		5 oz. 5 drs. (expressed.)	Greenish yellow	Is composed of two oils, of which one is very fluid, and the other, in smaller quantity, is thick and greenish.
Piper cubeba	Seeds	4 oz. 2 drs. (Baume.)	Colourless or greenish	
Anethum fœniculum	Seeds	8 oz. 2 drs. 48 grs. to 10 oz.	Colourless or citrine	
var. dulce	Seeds	2 oz. 3 drs. 18 grs.	Colourless or citrine	
Caryophyllus aromaticus (Moluccas)	Dried florets	3 lb. 14½ oz. (F. Hoffman.)	Colourless	
		4 lb. 8 oz. (Tromsdorff.)		
		5 lb. 6 oz. (Osterm.)		
		3 lb. 6 oz. 2 drs. (Vauquelin.)		

Caryophyllus aromaticus (Isle of Bourbon)		3 lb. 8 oz. 2 drs.	Colourless	Finer, clearer, lighter, and sweeter than that of the Moluccas. (Vauquelin.)
Juniperus communis	Entire berries	1 oz. 2 drs. to 4 oz. (Baume.)	Slightly amber or citrine	
	Entire berries	9 oz. 3 drs. (Cartheuser & Hoffman.)	Slightly amber or citrine	
Amomum zingiber	Dry root	3 oz. 1 dr. (Cartheuser.)	Colourless or citrine	Very fluid, very aromatic, and of a taste sweet at first then bitter.
Lavandula vera	Dried spikes	5 drs. 45 grs. to 6 oz. 2 drs. (Carth.) 6 oz. 2 drs. to 1 lb. 2 oz. 6 drs. (Hoffm.) 5 oz. 2 drs. to 9 oz. 1 dr. 8 grs. (Baume.) 12 oz. 6 drs. (Lewis.)	Citrine	Sp. gr. .936. (Gmelin.)
Lavandula spica	Dried spikes	6 oz. 2 drs. (Hoffm.) 1 lb. 4 oz. (Carth.)	Yellow	Sp. gr. .898. (Gmelin.)
Myristica aromatica	Dry seeds (nutmegs)	12½ oz. to 15 oz. 5 drs. (Cartheuser.) 1 lb. 9 oz. (Hoffman & Geoffroy.)	Golden Yellow	
	Dry arilla (mace)	15 oz. 5 drs. to 1 lb. 2¾ oz.		
Melissa officinalis	Fresh plant (whole)	2 to 3 drs. (C. Recluz.)	Colourless	Sp. gr. .975.
Mentha piperita	Fresh plant (whole)	3¼ oz.	Colourless	Sp. gr. .92.
	Fresh plant (whole)	2 oz. 2 drs. 54 grs.		
	Fresh plant (whole)	6 drs. 20 grs.		
Myrtus pimenta	Dry fruit	1 oz. 4½ drs. (Geoff.) 3 oz. 1 dr. (Heyster.)	Colourless	Heavier than water, very similar in smell, taste and specific gravity to the oil of cloves.
Citrus aurantium	Fresh flowers	4 drs. 62 grs. to 5 drs.	Colourless	
Myrtus pimenta	Dried fruits	1 oz. 4½ drs. (Geoffr.) 3 oz. 1 dr. (Heyster.)	Colourless	Heavier than water, and very similar in smell, taste, and specific gravity to oil of cloves.
Piper nigrum	Dried fruits	4 oz. 1 dr. 20 grs. (Cartier.) 7 oz. 2½ drs. (Newman.)	Citrine or golden yellow	
Mentha pulegium	Fresh plant in flower	1 oz. 3 drs. 39 grs.	Citrine	
Rosmarinus officinalis	Fresh leaves	1 oz. 24 grs. (Baume.)	Amber	Proust extracted one-tenth of camphor.
	Dried plant in flower	2 oz.		
		3 oz. 2 drs. 3 grs. (Newman.)		

Table of Volatile Oils, by C. Recluz, continued.

Ruta graveolens	Whole pl. fresh	1 oz. 2 dr.	Amber or green	
Acorus calamus	Fresh root	3 drs. 14 grs.	Citrine	
	Dried root	3 oz. 1 dr. to 5 oz. 1 dr. 40 grs.		
Rosa centifolia	Fresh flowers	62½ grs. (Hoffman.) 1 dr. (Tachenius.) 2 drs. (Humberg.)	White or yellow	Crystallizes below 54° F.; composed of two oils, one liquid, the other concrete, both lighter than water.
Crocus sativus	Dried stigmata	4 oz. 5½ drs. (Newman.) 2 lbs. 8 oz. (Henry.)	Golden yellow	Contains much camphor; heavy, fluid, of an acrid, burning, slightly bitter taste; very soluble in water, changes with age into a white substance, which floats on water.
Laurus sassafras	Dried root	3 oz. 1 dr. (Hoffman.) 5 oz. (Newman.) 8 oz. 2 drs. 40 grs. (Cartheuser.)	Limpid	The heaviest of the known volatile oils.
Salvia officinalis	Fresh plant in flower	4 drs. 49 grs. to 5 drs. 40 grs.	Greenish yellow	Sp. gr. .864.
Juniperus sabina	Dried leaves	4 lbs. 11 oz. (F. Hoffman.)	Citrine	
	Fresh leaves	2 oz. 1 dr. 48 grs. to 6 oz. 3 drs. 67 grs.		
Tanacetum vulgare	Dried plant in flower	1 oz. (C. Recluz.)	Reddish	
Thymus vulgaris	Dried plant in flower	4 oz. 5½ drs.	Golden yellow	
Valeriana officinalis	Dried roots	7 drs.	Pale greenish	Very fluid, becomes viscous in the air, perhaps converted into oxalic acid. (Tromsdorff.)
Wintera aromatica	Dried bark	1 oz. 20 grs.	Citrine	Liquid, and lighter than water; by long standing separates into two parts, one sebaceous, white, heavier than water, the other citrine, fluid, lighter than water.

The above weights are French. The pound contains 16 oz.; the ounce, 8 drs.; the drachm, 72 grs.

Remarks on the Native Oil of Laurel.—By Thomas Hancock, M.D. Fellow of the Medico-Botanical Society.—Addressed to the President and Fellows.

Gentlemen,

As you have done me the honour of electing me one of your body, I beg to draw your attention to a very extraordinary vegetable production, the knowledge of which has hitherto been almost exclusively confined to the natives of Spanish Guiana.

This substance, which has been very injudiciously termed "Azeyte de sassafras" (an appellation which tends to confound it with the essential oil yielded by the *laurus sassafras* of the northern continent of America), affords, so far as my knowledge extends, an extraordinary and solitary instance of the production of a perfectly volatile liquid, without the aid of art. Substituting for the appellation to which I have objected the provisional name of "native oil of laurel," I shall describe the method of procuring it, and enumerate its principal chemical and medicinal properties, so far as they have been investigated and examined.

The native oil is yielded by a tree of considerable magnitude; its wood is aromatic, compact in its texture, and of a brownish colour, and its roots abound with essential oil.

This tree, which is found in the vast forests which cover the flat and fertile regions between the Orinoco and the Parime, has, from an analogy already alluded to, been supposed to belong to the natural order Laurinæ; and though Humboldt and Bonpland do not seem to have been acquainted with its singular and important produce, its botanical characters may very possibly have been described in their Plantæ Equinoctiales, under the genera Ocotea Persica, or Litsæa. This question, however, I am unable to solve, as I have never seen the parts of fructification.*

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* It has, since the above was written, been supposed to be the produce of the

The native oil of laurel is procured by striking with an axe the proper vessel in the internal layers of the bark, while a calabash is held to receive the fluid. So obscure, however, are the indications of these reservoirs, that the Indians (with perhaps a little of their usual exaggeration) assert, that a person unacquainted with the art may hew down a hundred trees without obtaining a drop of the precious fluid. In many of its properties the "native oil" resembles the essential oils obtained by distillation and other artificial processes; it is, however, more volatile and highly rectified than any of them, its specific gravity hardly exceeding that of alcohol; when pure, it is colourless and transparent, its taste is warm and pungent, its odour aromatic, and closely allied to that of the oily and resinous juice of the *coniferæ;* so striking is this resemblance, that a friend to whose inspection I submitted the oil, pronounced it, rather hastily, to be "spirit of turpentine." It is volatile, and evaporates without a residuum at the atmospheric temperature. It is inflammable, burning entirely away, and except when mixed with alcohol, gives out in its combustion a dense smoke. Neither the alkalies nor acids seem to exert any sensible action on the "native oil." Upon dropping into it sulphuric acid, the latter assumes a momentary brownish tinge, but soon resumes its transparency, remaining at the bottom of the vessel. The oil of laurel dissolves camphor, caoutchouc, wax and resins, and readily combines with the volatile and fixed oils. It is insoluble in water, soluble in alcohol and ether. Though the specific gravity of the oil exceeds that of ether, yet the compound, formed by combining them in the proportion of one part of the former to two of the latter, floats upon the surface of pure ether, and may therefore be the lightest of all known liquids.

With respect to the medicinal properties of the "native oil," it bears, when externally applied, the character of a

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Ocotea Cymbarum, a doubtful species, thus described in Kunth's Syn. Plant. Æquin. Orb. Nov. 1. 458.

powerful discutient, and appears, when exhibited internally, to be a diaphoretic, diuretic, and resolvent; by many it is believed to be analeptic, alterative, anodyne, and to promote the exfoliation of carious bones. Without listening to the extravagant reports of the Indians, who exalt it into a panacea, we must admit that its efficacy has been demonstrated in cases of rheumatism, swellings of the joints, cold tumours, pains in the limbs, and in various disorders supposed to originate in a vitiated state of the blood. In all these cases it is exhibited in doses of from 20 to 40 drops on sugar, twice a day, accompanied by frequent and long continued friction of the parts affected with the oil, while the body is kept moderately warm, and a free use of diluting drinks prescribed to the patient. The same practice is said to have been attended with the happiest effect in paralytic disorders; for this I cannot vouch, but have found it a valuble remedy in cases of nervous headachs, sprains and bruises. A decoction of the root has been employed as an alterative in various chronic complaints, and with much success.

I am fully aware of the reaction that often results from over excited and disappointed expectation, and of the discredit into which a new remedy frequently falls in consequence of the unmerited encomiums which those who bring it into notice have injudiciously bestowed upon its virtues.

> Quicquid excessit modum
> Pendet instabile loco.

However slight the credibility we may feel inclined to attach to the evidence of the Indians, upon which our knowledge of the medicinal properties of the "native oil" almost entirely reposes, the information derived from experience surely claims that attention, and justly challenges that examination which we should not hesitate to bestow on the speculations of the mere theorist. Let inquiries be instituted and experiments be made by those who, by situation and scientific attainments, are qualified for the task. By these investigations it may not only

be ascertained what degree of confidence ought to be reposed in the unqualified encomiums which the Indians lavish upon the anomalous production, but properties unknown to them may be discovered, and its history, which they have been accused (perhaps unjustly) of involving in obscurity, be satisfactorily elucidated. To the chemist and vegetable physiologist in particular the "native oil of laurel," elaborated by the unassisted hand of nature, in a state of purity which the operose processes of art may equal, but cannot surpass, presents an interesting subject of inquiry, and a wide field of speculation.—*Journ. Morb. Anat., Opth. Med. & Pharm. Anal.*

Demerara, Feb. 20, 1826.

Table of the Loss Experienced in the Pulverization of 100 *parts of various Drugs.*

Ipecacuanha	13 per cent.
Jalap	8
Rhubarb	6.2
Squills	12.5
Cinchona	6.3
Gum Arabic	6.5
Scammony	5
Cantharides	7.3
Sal ammoniac	2
Cream of tartar	3
Antimony	3
Gum tragacanth	6.4
Cinnamon	6.4

Dictionnaire des Drogues.

On Rhubarb.

Few medicinal plants have attracted a greater share of attention than the one named above. Travellers have been sent at royal expense to explore the countries of Asiatic Tartary, in which it was said to be indigenous, for the purpose of discovering its actual locality, and procuring some of the genuine seeds. These attempts have generally proved unsuccessful, owing to the vigilance of those Tartarean merchants who monopolize the trade in this article. Seeds were, however, sent from India to England, and the cultivation commenced at one time with so much zeal and apparent success as to hold out the prospect that the home production would supply the home demand. These views have not been realized, owing either to an actual deterioration of the plant in a climate and soil not natural to it, or to the influence of prejudice in favour of an exotic medicine. We have little, perhaps nothing, new to offer upon this interesting subject. But having met with an article in the Dictionnaire des Drogues giving a distinct account of the different species of this plant believed or known to exist, we thought it might furnish an essay not unacceptable to many of our readers, especially the junior members of the profession. Their improvement is an important object in the publication of this journal, and they cannot be too familiar with every thing relating to the leading articles of the materia medica.

Under the name of rhubarb is designated the root of different plants belonging to the genus rheum, which form part of the family of polygoniæ and enneandria trygynia. The commercial varieties are distinguished by the names of the countries from which they are imported. Thus we have Russian and Chinese rhubarb, to which may be added the rhapontic, a product also of oriental climates, and formerly much employed in medicine.

We shall proceed to notice these three in detail, to which will be added some remarks on the species at present cultivated in France.

Rhubarb of Russia or Bukharia. *Rhabarbarum. Rheum verum seu Rossicum, Offic.*—This variety is found in pieces slightly flattened, irregular, and sometimes angular, from one to two inches thick, and pierced with long holes. These are peeled, and present externally a lively yellow colour; while internally they are marbled red, white, and yellow, very irregular, and sometimes disposed in a stellated form. In general it is less compact than the Chinese, which renders it more difficult to cut, and causes it to yield under the knife like a spongy body. Its odour is well developed, its taste bitter and astringent, and to the saliva it imparts a deep saffron yellow colour.

This, the most highly esteemed of the rhubarbs, is the product of the *palmatum, undulatum et compactum,* plants which are indigenous to Tartary, the Asiatic provinces of Russia, and extending almost to the confines of China.

Much has been written to prove that it was to one species more than another we are indebted for this article; but there is ground for believing that it is furnished equally by all three, and derived second hand from Russia by all the rest of Europe.

Rhubarb of China. *Rheum Sinense, Tartaricum seu Turcicum, Offic.*—We are presented with this article in round or cylindrical pieces, frequently pierced with small holes, through which has been passed a cord to suspend it during desiccation. The exterior is of a dirty yellow, the texture compact, marbled with hard veins, which are of a dull brick-dust colour; the odour is well developed, and the taste bitter.

The rhubarb of China colours the saliva of an orange yellow, and crackles under the teeth. It is heavier than the Russian variety, and the colour of its powder approaches the tinge it imparts to saliva. Although less esteemed than the preceding, it possesses, nevertheless, very active proper-

ties. In commerce we find the pieces peeled like the Russian, but they are readily distinguished by their greater compactness of texture, the small holes which penetrate them, and especially by the colour, which is more obscure or greyish.

The rhubarb of China or of India comes to us directly from Canton by sea. It is probably to this long voyage, and the humidity which is the consequence of it, that we are to attribute its greater liability to worms and mould, as well as the dullness of its colour. For a long time its true origin was unknown, and it was conjectured that it was furnished by some varieties of the plant which afforded the rhubarb of Russia. Dr Wallich, superintendent of the botanical garden of Calcutta, having at length procured some seeds of the Chinese rhubarb, collected on the spots where it grew spontaneously, raised plants from them, to which he gave the name of *emodi*, the same by which the natives designate it. By Colebrooke it is referred to the rheum australe.

Rhubarb Rhapontic. *Rhaponticum, Offic.*—Two varieties of this are found in commerce, the one indigenous, the other exotic. The plant which furnishes the first, grows with facility in the climate of Paris, and the pieces are greater or smaller than the first, of a ligneous appearance, and externally of a grey reddish colour. Its transverse fracture presents a marbled surface, composed of hard striæ of a red and white colour, radiating from the centre to the circumference. It tinges the saliva yellow, but is not gritty under the teeth; possesses a mucilaginous, very astringent taste, and has a more disagreeable odour than the true rhubarb. Its powder has a shade of red which does not belong to the other varieties.

The exotic rhapontic is met with in pieces from three to four inches in length, and from two to three in thickness. Its appearance is less ligneous, and externally it is of a pale yellow, with less of the reddish hue than the cultivated va-

riety. The fracture presents the same radiated surface, and it is marked by the same physical properties which distinguish these from the true rhubarb, such as a peculiar odour, and especially a mucilaginous astringent taste, not sandy. The rheum Rhaponticum of Linnæus grows spontaneously in ancient Thrace, on the borders of the Caspian sea, between the Volga and the Uralian mountains, and in Siberia. This was the rhubarb of the Greeks, and when it enjoyed a distinguished reputation as a medicine, the *rumex Alpinus* was sometimes substituted for it: the latter still bears the vulgar name of *rhubarb of the monks*, and *rhapontic of the mountain*. The root of the great centaury (*centaurea centaurium*, L.) was named *Rhapontic. nostras*, because it was regarded as a succedaneum for the exotic Rhapontic. It may be easily distinguished by its sweetish taste and odour, resembling burdock.

Rhubarb of Europe or of France. *Radices rhei nostratis, Offic.*—This generally presents itself in the form of large pieces, longer than they are thick, having a more ligneous texture than the preceding kinds, and marbled with very hard veins. Its odour is disagreeable and nauseous, taste astringent, scarcely gritty under the teeth, and slightly tinging the saliva yellow. The powder has a higher shade of red than belongs to the exotic rhubarbs. Of this kind there is but a single commercial variety, although produced from different species of the *rheum* successfully cultivated in several parts of Europe. All the species of the genus rheum are perennial, and bear vigorous stems. Their leaves, situated at the inferior part of the stem, are exceedingly large, petiolated, and sheathed, sometimes undulated, sometimes palmated, lobed or simply dentated. The flowers are numerous, grouped in long and branching panicles to the extremity of the stalk.

The *rheum palmatum* of L., which is believed in the wild state to be the species producing the best rhubarb, is distinguished from its congeners by its palmated leaves, which

are divided down to the middle into seven acute lobes. The recent roots are large, divided into thick ramifications, brittle, interiorly yellow, and covered with a brown bark.

The *rheum undulatum* of L. has waved leaves, almost covered with hairs, and having at the base on each side a very large sinus. The recent roots are large, round, divided into branches which bury themselves deeply in the soil; interiorly they are of a bright yellow, externally covered with a brown bark.

The *rheum compactum* has leaves almost lobed, denticulated, very obtuse, glabrous and shining. The roots are large, divided into numerous, long ramifications, with a beautiful reddish yellow colour within. This species appears to us to approach the rheum australe of Colebrooke; and of latter times the true rhubarb of China has been attributed to it. Its essential character is round and dentated leaves.

The *rheum rhaponticum* shoots out from its root, very large heart-shaped shining leaves, of a deep green colour, supported on long furrowed footstalks. The roots are large, fleshy, frequently branching, variegated internally with yellow and red, and invested with a yellow covering, slightly shaded red.

Our knowledge respecting the culture of rhubarb in its native climate, is far from being accurate or extensive, having been derived principally from the Bukharian merchants, who transport it to the entrepot established by the Russians. According to the accounts of these merchants, who contradict themselves in many points, the plant grows at the base of a chain of mountains; while other travellers assure us that it is on the summit of the highest mountains, in the neighbourhood of eternal snows, in soils of different kinds; all agree, however, that light and sandy soils are the most congenial. The roots are collected twice in the year, autumn and spring, and those only are selected which have attained the age of six years. As soon as they are drawn from the ground, they are deprived of their bark, cut into pieces, and suspended on strings, in order to facilitate their drying,

in places well ventilated, but protected from the rays of the sun. The desiccation is the most important operation, for upon this, in great measure, depend the qualities of the rhubarb; and by this process it loses about four-fifths of its original weight. A second operation succeeds to this, which is properly called the preparation of the rhubarb, and consists in cleansing the roots afresh, dividing them into smaller pieces, and piercing them, not merely with the view to suspend them in the air, but to ascertain that internally they are not damaged.

It is in this state that rhubarb is thrown into market by a company of Bukharian merchants, who have received from the Chinese government the monopoly of its trade. This company resides at Sining-Fu, about 20 days journey from Kian-Sin and Schan-Sin, cities in the west of the vast territory of Kansu. The merchants provide themselves with rhubarb in these cities, and from Sining-Fu it is exported, on the one side into China, and on the other into Russia through Kiatcha.

In Canton it is purchased directly from the agents of this company by the English, and other commercial people of Europe, and it is proverbial that the article is not selected with the greatest attention to quality at this place. On the contrary, the greatest care is bestowed upon that which is forwarded to Russia through Kiatcha. Here resides an apothecary, authorized by government to examine with the most scrupulous accuracy all the pieces, and to reject, and subject to the flames all that are defective. It is to this severity on the part of the Russians in the choice of their rhubarb, that it owes its reputation for superiority over the other kinds. The Bukharian merchants are bound to deliver by contract at Kiatcha 1000 punds annually; but owing to the cutting, and selection it there undergoes, it is seldom that the quantity sent forward into the Russian markets exceeds 5 or 600 punds of genuine rhubarb.

The Russians have, by every imaginable means, solicited these merchants to furnish them with the true rhubarb plant;

but their good sense dictated the refusal of all these seducing offers, as they readily perceived they would thus annihilate a lucrative branch of commerce, which enabled them to levy a sort of annual tribute upon the Muscovite empire. But if we reflect a moment on the powerful influence which soil and climate exercise over the qualities of vegetable productions, we shall be satisfied that it is almost as important to be acquainted with facts respecting these points, as to possess the plant that is, or may be regarded as the source of the best rhubarb of commerce. Yet were we even in possession of all the necessary information on this head, should we be able to imitate the process of nature? That is the great problem in the cultivation of rhubarb. We do not believe that this difficulty can be completely surmounted, any more than good wine of Burgundy or Bordeaux, can be made in any other than these localities, although the genuine vine may be procured from these celebrated vineyards. Nevertheless it is by conforming as much as possible to the circumstances of climate, after we have learned the geographical distribution of the different species of rhubarb, as well as the nature and exposure of the soil they prefer, that the European cultivator can hope to obtain an indigenous medicine, that shall rival the exotic in its general properties. Already the culture of this article has been much improved in England, France, Belgium, Germany, and even Sweden. We shall confine our remarks to the efforts made for its introduction into France.

The first essays were made at Grosbois and Claye near Paris, on the rheum palmatum. It is to be regretted that this species, which appears to be the type of the true rhubarb, should have deteriorated to such a point, that they have declined the culture of it, and prefer to it the undulatum. It has been correctly remarked, however, by M. Guibourt, that the cultivated root of the rheum palmatum, especially when it is old, although having the compactness of a substance which had been saturated with water before

drying, approaches very nearly in its physical and chemical properties to the rhubarb of China.

M. Genthon, pharmacien à Lorient, successfully cultivates the different species of rhubarb, and has formed in the department of Morbihan, an establishment named *Rheumpole*, which furnishes annually about 1500 pounds of indigenous rhubarb.

He sows the seed in the spring in a light soil, transplants the young sprouts the same season in the following year, and places them at the distance of about 3 feet from each other.

The roots are not taken up before the autumn of the 5th or 6th year, when they are found to weigh from 15 pounds to 25 pounds, are more spongy than fibrous, and are difficult to dry in consequence of the large quantity of mucilaginous and extractive matter they contain.

After the roots are drawn from the ground, they are washed in a large quantity of water, and those of the smallest size, and the radical fibres separated. They are then plunged into fresh water a second time, cut into pieces of convenient size, deprived of their brown bark by rasping, and to conclude the cleansing process are suffered to soak in cold water for three or four hours. They are then placed on a hurdle to drain, during which time they exude a gummy, gelatiniforme matter, and finally are permitted to dry in a stove heated from 120° to 140° centigrade. The rhubarb by drying loses from 70 to 72 per cent. of its weight. The wrinkles on the surfaces of the pieces are smoothed down by a rasp, and they are then placed in a barrel suspended on an axle, and subjected to a rotatory motion for half an hour. By their mutual friction a fine powder is disengaged, which covers, and gives to them the sensible properties of good exotic rhubarb. Some chemical differences have however been remarked, which have diminished it in the estimation of practitioners, and which we shall notice in the following pages.

The first chemists who made a regular analysis of rhubarb, confined themselves to detecting the existence of the gum-

my, resinous and colouring principles. The celebrated Scheele, and Model of St Petersburg, stated that the property so striking in the rhubarbs of India and Russia, of crackling under the teeth, depended on the oxalate of lime which they contained in abundance, but which was almost entirely absent in the indigenous variety. They also remarked that the Russian contained less of it than the Chinese. The more recent analyses of modern chemists, have displayed the existence of some more vegetable principles. M. Henry, Sen. chief of the central pharmacy of the hospitals of Paris, has separated a yellow colouring matter of a particular nature. It is volatile in the fire and gives off yellow odorous fumes, having the smell and taste of rhubarb. The alkalies brighten and redden this substance, the acids and metallic solutions precipitate it yellow, the sulphate of iron green, and with nitric acid it forms tannin. It is the *caphopicrite* of many chemists. M. Caventou obtained another colouring principle, to which he gave the name of *rhabarbarin*, but which must not be confounded with one of a similar name *rhabarbarine*, discovered a long time since by Pfaff. The latter is deep brown, opake, and possessing properties which indicate it to be composed of several principles; and it is highly probable that it is identical with the caphopicrite of M. Henry.

The rhabarbarin of M. Caventou is yellow, susceptible of crystallization, insoluble in cold, but soluble in hot water, alcohol and ether, and endowed with a strong odour of rhubarb, and a rough, bitter taste. With all the acids it forms insoluble compounds.

Some chemists, and particularly M. Nani, an Italian pharmacien, announced the discovery of a vegetable alkali in rhubarb, with which they had formed a sulphate; but M. Caventou has ascertained that this pretended sulphate of rhabarbarin, was nothing more than sulphate of lime, tinged with the extractive matters of the root. Of the *rheumic acid* of Henderson we say nothing, as M. Laissaigne has identified it with the oxalic.

The odour of rhubarb appears to be due to a very diffusible volatile principle, partaking of the nature of volatile oils, although it has not yet been separated in a state of purity. M. Bressy, physician at Arpajon, stated in a memoir addressed to the Academy of Medicine, that he had procured an appreciable quantity of this oil; but the commissioners of the academy were unable to collect any of it, although they repeated the process of M. Bressy in all its details.

M. Henry has published the following results of an analysis of Chinese rhubarb: 1. A particular kind of yellow colouring matter. 2. A sweet oil, becoming rancid by heat, soluble in alcohol and ether. 3. Amylaceous fecula. 4. Gum. 5. Tannin. 6. Ligneous matter. 7. Oxalate of lime (forming one-third of its weight as before stated by Scheele). 8. Super-malate of lime, sulphate of lime, and a salt with a base of potash and oxide of iron. (These last ingredients in very small quantities.)

Another analysis published by Brande (Thomson's Ann. XVII. p. 469) contains the remarkable statement that oxalate of lime is not found in rhubarb. Nevertheless the existence of this salt in the exotic varieties is so uniform that it serves to distinguish them from those of European culture, which do not contain it at all, or at any rate but in extremely small quantities, not exceeding one-tenth.

On the other hand, the cultivated are richer in tannin, and are consequently more astringent than the foreign rhubarbs. Possessing at the same time a much greater abundance of amylaceous fecula, and colouring materials, they present a redder appearance. It is therefore necessary to give twice or three times the quantity in order to produce the effect of an ordinary dose of the Russian or Chinese varieties.

Finally, M. Peretti, of Rome, gives the following results from a new analysis of rhubarb:—1. Tannin; 2. Gallic acid; 3. Malate of lime; 4. Gum; 5. Sugar; 6. Fixed oil; 7. Volatile oil; 8. Resin; 9. A yellow solid colouring substance; 10. Oxalate of lime; 11. Ligneous fibre. According to the

experience of Dr Tagliabo the resin is the most active part of rhubarb; and taken in the dose of 10 or 12 grains, it purges strongly without pain (Journal Romain, 1826). It is well known that the oxalate of lime, an inert and insoluble salt, exercises no influence over the active qualities of rhubarb; the latter are entirely due to principles soluble in alcohol and water. The following may be stated as the proportions of soluble materials in 100 parts of different varieties of this root:—Chinese, 74; indigenous from the *rheum palmatum*, 64; indigenous from the *rheum compactum*, 50; indigenous from the *rheum undulatum*, 32; indigenous from the *rheum rhaponticum*, 30.

Fifty grammes of rhubarb furnished the following quantities of watery extract:—Chinese, 22 grammes; Russian, 15.45 gram.; French, 16.857 gram. The same quantity of rhubarb, treated with rectified alcohol, furnished the following relative proportions of extract:—Chinese, 8 grammes; Russian, 8.50 gram.; European, 9.70 gram. Rhubarb is a medicine having two distinct modes of action; in small doses (of four or eight grains) its effects are tonic, confined to the stomach, and augmenting the digestive powers. To answer this purpose it should be taken a short time before meals in any agreeable vehicle. In larger doses it acts as a purgative, still, however, giving evidence of that tonic property which essentially belongs to it.

In the shops are prepared a simple and compound syrup, (compound syrup of endive) an alcoholic tincture, a wine, an extract, lozenges, &c. It enters into a crowd of officinal preparations, such as the elixirs of Stoughton, of long life, double catholicon, &c. &c.

We have stated that the exotic rhubarb, particularly the Chinese, was liable to injury from the voyage by sea. It is also subject to the depredation of worms; which the vendors conceal by stopping the holes with a paste made with powdered rhubarb and gum water; or sometimes with yellow ochre, and then rolling the dry pieces in the pulverized root;

these frauds are easily detected by rubbing off the dust which adheres to their surfaces.

Rhubarb has also been used as a colouring material; and for these purposes the European varieties might be advantageously employed, as they abound with the necessary ingredients.

The leaves, or more properly the footstalks of the leaves, especially those of the rheum ribes, L. a species originally from Persia, are frequently employed in England as an article of food. Their acid taste resembles considerably that of currants or gooseberries. The name of rhubarb has been applied to roots which have only a very slight resemblance in form and properties to the genuine article. Thus:

Rhubarb of the Alps and of the monks is the roots of the ***rumex alpinus.***

Rhubarb of the beggars, or ***false rhubarb,*** is the root of the ***thalictrum flavum,*** a plant of the family of the ranunculi, very common in the humid parts of Europe, and possessing a juice sharp, bitter, and of a yellow colour.

Rhubarb of the peasants, or black alder. B. E.

Chinese Materia Medica.

The Chinese may be considered as one of the most singular people on the face of the earth. Having advanced from barbarism to a very considerable degree of civilization and refinement, they suddenly stopped short in the career of improvement, and now present the anomalous spectacle of a nation stationary in the arts and sciences. In the medicine of such a people we might expect to find, by careful investigation, some very correct views of practice, linked with the most childish prejudices and puerile conceits.

In a paper communicated by John Reeves, Esq. F.R.S. to

the Medico-Botanical Society of London, giving some account of the articles of the materia medica employed by the Chinese, we notice a few which are familiar to us: such as datura stramonium; ficus, or fig; plantago or plantain; ricinus communis, young shoots, unripe capsules, and also the ripe seeds; young shoots of two or three species of croton; croton tiglium; seeds which have been long known among the Chinese as a drastic purgative; some species of euphorbia, and taraxacum. These, with several others which appear to be peculiar to China, are much employed by the itinerant doctors, for the diseases of the poorer classes of people. Many of these they pound into pulpy masses, and apply poultice-like to wounds, bruises, swellings and sprains.

The poorer classes depend upon herbalists for their supply, while the more opulent resort to the druggists; and the consumption of drugs in that country is said to be immense, for they are almost as fond of them as they are of food. These people, though sufficiently careful in the expenditure of their money on ordinary occasions, lavish it freely on a few articles of fictitious value.

Among these may be reckoned *deers' horns* brought down in the velvet state from Tartary, and which are sold at from 60 to 80, and even 100 dollars per pair; they are usually sliced thin, and boiled in soup, as a strengthening and restorative medicine. The horns possessing these virtues are procured from one particular species of deer only.

Birds' nests (of the *hirundo esculenta*), though more properly speaking an article of luxury than of medicine, are held in high estimation by the Chinese as a tonic and restorative. They are uniformly kept at the druggists' shops, and two or three persons are constantly employed in picking off the adhering feathers, and cleansing them from any other discoloration. When thus cleansed their estimated value is about twice their weight in silver, and they form the first dish at every Chinese dinner of respectability.

Opium, too, may perhaps with more propriety be considered a luxury than a medicine; for though publicly prohibited

by government, it is very generally smoked, and by the officers of government no less than others.

The consumption is so great that it annually drains the country of eight millions of dollars.

The prejudices of the Chinese in favour of particular medicinal substances, and against others of an equal if not superior quality and of a kindred character, appear to be neither the result of reason nor experience. Their reverence for antiquity and the established customs of their country, has grown into such an inveterate habit of the mind, that it now forms a part of their mental constitution, and offers a most effectual barrier to that improvement which would proceed unaided, if freed from such trammels. Thus in the article of cassia: of which vast quantities are annually brought from the province of Kuang-Se (whose principal city derives its name from the forests of cassia surrounding it) to Canton, and thence shipped to Europe, at about 24 dollars for 133 1-3 pounds; while they themselves use a much thicker bark, (unfit for the European market), and which sells as high as 200 dollars per pecul, or 3 dollars per pound. Some choice pieces have occasionally been sold as high as 100 dollars per catty or 1 1-3 pound.

Camphor is another article in which, let its source be what it may, if perfectly purified, there can be very little if any difference. With this substance the market of Canton is largely supplied from the island of Formosa, and foreigners supply themselves with it at 34 dollars per pecul: while the Chinese will only employ that which is brought from Sumatra, called Malay camphor, and will pay for it as many dollars per catty, or 100 times as much as they dispose of their own for in commerce. It has indeed been sold for 4000 dollars per pecul.

European physicians who have used them both have been unable to distinguish any difference in their medicinal properties. The finest specimens of English camphor have been taken to Canton, but the Chinese doctors will at once recognise their own, and adhere to it.

But all these preferences, extravagant as they may be thought, "hide their diminished heads" when brought in competition with the far-famed *ginseng*. Of this the missionaries and other Chinese travellers have told the most marvellous stories, and the natives themselves still attribute to it miraculous powers. The Americans have in vain endeavoured to imitate the Chinese mode of preparing it; and though they buy it at remunerating prices of from 35 dolls. to 200 dolls. per pecul, yet they ascribe to it no virtues when compared with their own of Tartaric origin. For the latter they pay the enormous prices of from 20 to 250 times its weight in silver; and some choice picked specimens have actually brought (from wealthy epicures) the almost incredible price of 500 times their weight in solid silver. Mr Reeves states that he saw such a piece, carefully shut out from profane eyes, and excluded from the air by being inclosed in two or three canisters one within the other.—*Journ. Morb. Anat. &c.* B. E.

Miscellany.

Iodine in muriate of soda.—This fact was discovered by M. Barruel, when about to prepare some muriatic acid for the lecture of M. Orfila at the Faculty of Medicine of Paris. He poured some sulphuric acid on the marine salt, and immediately the matrass was filled with violet vapours: disconcerted with this result, he tried the experiment again with a fresh and different portion of salt, but the same consequences followed, and the violet colour was perceived by the class. This vapour condensed itself on the conducting tube in the form of beautiful brilliant plates, of a bluish grey hue. Finally it was dissolved in the hydrochloric acid, and coloured it of an orange red, which finally changed to a greenish yellow. He *denominates* it the *grey* muriate of soda, and supposes the salt spring, from which it was made, to be contaminated with a hydriodate, either originally or by having been repaired with materials which contained the iodine in a latent state.

Morphia extracted by fermentation from opium.—In our last number we mentioned the fact that M. Blondeau had employed fermentation successfully to separate morphia from opium. The following is a short account of the process he employs. Take pure opium and subject it to the action of twice its weight of warm water; to this add the yest of beer, and suffer the fermentation to proceed until it ceases. Filter through linen and wash the residuum; mix the liquors and add to them ammonia to precipitate the

morphia. Collect the precipitate, wash and treat it with water sharpened with hydrochloric acid; filter and evaporate. The hydrochlorate is procured in a coloured mass, which treat with water and animal charcoal. Decompose this salt with ammonia, and crystals will form of a yellowish amber colour. These crystals are morphia sufficiently pure for ordinary use. M. Blondeau states that he has obtained thirteen or fourteen gros (drachms) of morphia from 1 lb. of pure opium by the employment of this process. He proposes to apply it to the separation of morphia from the indigenous poppy.—*Journ. de Chimie Med. de Pharm. et de Toxicolog. Sept.* 1828.

Carthagena bark.—On the 26th of July 1828, M. Pelletier stated that having experimented on a variety of bark, which the sellers called *calysaya*, and the buyers *carthagena*, he had ascertained that this substance was not a cinchona, and that it contained a particular substance which was neither quinine nor cinchonine. It formed with sulphuric acid a salt of a gelatinous appearance, and with muriatic a crystallizable pearly salt.—*Journ. de Chim. Med. de Pharm. et de Toxicolog. Sept.* 1828.

Sulphate of zinc and sulphate of magnesia.—It ought to be generally known, if it is not, that the sulphate of zinc may be crystallized in such a form as closely to resemble the sulphate of magnesia; so much so that that they may be mistaken for each other. MM. Labarraque and Lecanu called the attention of La Société de Pharmacie to this fact in January last, and stated that the difference between these salts might be readily ascertained by adding a solution of caustic potash. This will occasion a precipitate, and if it be the sulphate of zinc that is operated on, an excess of the alkali will occasion the precipitate to be redissolved, an event which will not follow the application of the test to the sulphate of magnesia.—*Journ. de Pharm. Jan.* 1829.

Parillina or the active principle of sarsaparilla.—M. Galileo Pallota has separated from this root an alkaloid substance, in which he supposes the virtue of it resides. We have not met with a process for procuring it, but it is probable it may be obtained by a formula the same in principle as that used for the extraction of quinine and other alkaloids.

It is described to be a white salt, pulverulent, light, permanent in the air, austere, slightly astringent, nauseous, and having a peculiar odour. It is insoluble in cold but very soluble in hot water. Slightly soluble in cold, very soluble in hot alcohol. It *reddens* turmeric paper, fuses at 212°, and is decomposed at a higher temperature: forms a sulphate with diluted sulphuric acid, but is decomposed by the strong acid. It forms neutral salts with the other acids.

From experiments made upon himself M. Pallota considers that *parillina* is a powerful debilitating medicine, diminishing the vital energy in proportion to the dose. The dose is from two to thirteen grains.—*Thomson's Dispensatory, from Journal of Science.*

Active principles of polygala senega.—From six ounces of this root Peschier separated 100 grains of a peculiar alkaline principle, which he has named *polygalina*—united with a new acid, which he has denominated the *polygalinic;* and this salt he supposes to be the active principle of Seneka root.—*Pharmacop. Batav. Lipsiæ*, 1824.

Kino.—All the varieties, according to Vauquelin, contain a species of tannin, but no gallic acid. They dissolve in solutions of pure potass and of ammonia, and no precipitation takes place on the addition of water. Some chemical change however is effected, and the astringent property of the kino is completely destroyed, a fact which ought to be kept in remembrance in prescribing this remedy.—*London Dispensatory, 4th edition.*

Watery extract of aloes.—Mr Battley has made some simple experiments on the aloes vulgaris, or Barbadoes aloes, by which it appears, that the cold watery solution, evaporated to the consistence of an extract, contains all the valuable part of the medicine, divested of its acrid or drastic principles.

The following is the process employed:

"1. Two pounds avoirdupois, or 2 lbs. 4 oz. 2 dr. 48 grs. apothecaries' weight, of the extract of aloes, in the state in which it is imported from Barbadoes, imparted to cold distilled water 1 lb. 9 oz. 1 dr. 42 grs. The solution was of a fine yellow brown colour; its taste intensely bitter, yet free from the flavour peculiar to this species of aloe.

"2. The residuum of No. 1. imparted to hot distilled water 2 oz. 15 grs., leaving 4 oz. 2 dr. 15 grs. of undissolved matter. The solution was darker than No. 1. inclining to purple, less intensely bitter, but having the peculiar flavour of the aloe vulgaris.

"3. The residuum of No. 2. imparted to alcohol 3 oz. 4 dr. 48 grs., leaving 5 dr. 27 grs. insoluble in this menstruum. The tincture was of a deep brown colour, bitter and very offensive both to the taste and smell.

"4. The residuum of No. 3. imparted to one part of liquor potassæ diluted with seven parts of water, 4 dr. 48 grs., leaving 5.79 grs. of a dark earthy appearance, deprived of all aloetic properties, and void of any qualities that the taste or smell could detect. Even the alkaline solution, No. 4., of a deep, heavy brown colour, was so slightly aloetic as to be nearly insipid and inodorous.

"In No. 1. or the cold solution of the aloe again reduced to an extract, the profession will find at its disposal a valuable medicine; but the results Nos. 2, 3, will probably be found too drastic, and Nos. 4, 5, absolutely inert."—*Medico-Chirurg. Review, from Journal of Morbid Anatomy.*

Bitter of aloes.—Carbazotic acid.—The peculiar substance resulting from the action of nitric acid upon aloes, combines

with bases, and forms salts which detonate by heat: this is the aloetic acid of Braconnet. Mr Liebly has lately ascertained that this detonating principle is the carbazotic acid.

The bitter of aloes is plentifully obtained by the action of nitric acid of sp. gr. 1.25. With potash it forms a purple, slightly soluble salt, which precipitates the salts of baryta, lead, and peroxide of iron in flocks of a deep purple colour: the protonitrate of mercury is precipitated of a light red. Acetate of lead was employed to decompose the salt of potash, and, contrary to expectation, the weight of the precipitate was less than that of the salt of potash employed. The washings were of a yellow colour, and deposited crystals of the same character as the precipitate. These crystals were treated with sulphate of potash and heat, and yielded carbozate of potash, from which the carbozatic acid was separated. Another mode is to unite by heat aloes and nitric acid of 1.432, and after vapours cease to escape, add water to precipitate the bitter matter: to the remaining liquor add potash sufficient to saturate it and evaporate. The result will be crystals of carbozate of potash in fine crystals. The bitter of aloes appears therefore to be a compound consisting of a resinous matter and the above named acid.—*Phil. Mag. and Annals of Philosophy, Vol. IV. p.* 67.

Corrosive sublimate rendered more soluble in alcohol and ether by the addition of camphor.—Four parts of ether at the common temperature dissolve one part of corrosive sublimate, and M. Karls states that he has convinced himself of the following facts:

Three parts of ether dissolve one part of sublimate and one of camphor;

Four parts of ether and four of camphor dissolve two parts;

Four parts of ether and eight of camphor dissolve four parts;

Four parts of ether and sixteen of camphor dissolve eight parts of sublimate.

It is evident therefore that the solubility of the corrosive sublimate in ether is augmented in direct proportion to the quantity of camphor added.

The dissolving power of alcohol is equally increased; thus, at the ordinary temperature three parts of alcohol dissolve one of sublimate.

One part and a half of alcohol and half its weight of camphor also dissolve one part of corrosive sublimate.—*Journal de Chimie Medicale, &c. from Annales der Physick und Chemie*, 1827.

Process for preparing the red ferro-cyanuret of potassium.—This substance is noticed by M. Berzelius in his work entitled "*Analysis of Inorganic Bodies*," as among the useful reagents for the analysis of mineral waters. The following process, due to M. Gmelin, was employed by M. J. Girardin, attached to the central pharmacie of Paris.

Pass through a concentrated solution of ferro-prussiate of potassium, a stream of chlorine, until the liquor, which at first would precipitate of a blue colour the salts of iron at its *maximum* of oxidation, ceases to effect any change of colour or disturbance in them. Concentrate the liquor to two-thirds of its volume and set it to crystallize in a stove lightly heated: at the end of some time brilliant yellow needles will be obtained disposed "*in rosaces.*" By a second crystallization, very delicate needles are formed grouped in tufts, some of them large, others very small. The needles are of a ruby red colour, transparent, and very brilliant. M. Girardin regards them as octahedrons, very much elongated.

The leading feature of this salt, and which recommends it as a test is, that it precipitates the salts of the protoxide of iron of a green or blue colour, according to the quantity in solution, but on the contrary does not precipitate the salts of the peroxide of iron.

It is a much more delicate reagent, than the yellow ferro-cyanuret of potassium, since it detects 1-90,000 of the

protoxide of iron, whilst the latter indicates only 1-18,000 of this substance. It dissolves in twice its weight of cold, and less than its weight of boiling water.

Alcohol at 32° B. does not sensibly dissolve it, and absolute alcohol precipitates it from its aqueous solution in the form of a yellowish powder. The odour of this salt is slightly saponaceous; it does not act on turnsol, but changes to green the syrup of violets.—*Journ. de Chem. Med. de Pharmac. et de Toxicologie.*

Iodine in Saratoga Water.—William Usher, a student of Rutgers' medical college, communicated to professor Griscom the following experiments, proving the existence of iodine in Saratoga water. To a portion of the water of the congress spring, concentrated to about one-twelfth of its volume, he added a solution of starch, and then a small portion of sulphuric acid, in order to decompose (probably) the hydriodate of soda. The characteristic colour was immediately manifested, and was instantly discharged again by the addition of a solution of chlorine. Professor Griscom thinks it very probable that the presence of this substance adds to the medical efficacy of the water, especially in scrofulous diseases.—*American Journal of Science and Arts, No. I. April* 1829.

Analysis of Jalap.—M. Gerber (Brande's Archiv.) has endeavoured to find in the root of jalap, the alkaloid, designated by M. Hume, as *jalapine;* and is satisfied that this pretended alkali is nothing more than a mixture of resin and acetic acid. The researches of M. Dulk, published in the *Berliner jahrbuch der Pharm.* respecting jalapine, appear to confirm this opinion.—*Journal de Chimie Medicale de Pharm. Toxicolog. August* 1828.